SciArt in America

April 2015

ISSN 2372-2363

Want to get involved?

SciArt in America accepts story submissions on a rolling basis. E-mail us at *sciartinamerica@gmail.com*.

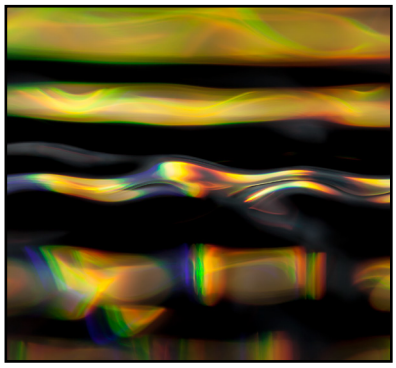
Submit to our Flash Fiction contest! Click here for details.

Cover image:
Sexual Cannibalism in Praying Mantis, Video Still, (2011) Dimensions variable, high definition.
Image courtesy of Phil Hastings.

SAiA

SciArt in America is based in New York City, New York.

Table of Contents



Letter from the Editor

Perception, with its capacity, limits, and behaviors, has been an important topic throughout art history. Those in science-based art take the exploration of the senses to a deeper level, revealing the biology and mechanisms behind what makes human life so rich. What does the smell of Parmesan cheese look like? What happens when sound waves encounter light waves? Is there more to whiskey than meets the eye? The answers to these questions, and more, are delightfully beautiful when answered by artists.

The organ of perception, the brain, is the topic of our lead article this issue. Exploring how contemporary artists have interpreted the most fundamental to the most cutting-edge in neuroscience, the brain is an increasingly hot topic in the art world, and the media art large. From film, to installation, to sculpture and painting, neuroscience-based art has much to look forward to in this scientific age of the brain.

Our featured artists this issue are Kate MacDowell, a sculptor of animals and ecologically inspired creatures, and Phil Hastings, a filmmaker inspired by biological patterns and genetic modification. And of course, where would artists like these be without the places that foster and showcase science-artwork? We have two Spaces & Places this issue, featuring the science-art scene in Boston, and Fermilab in Illinois.

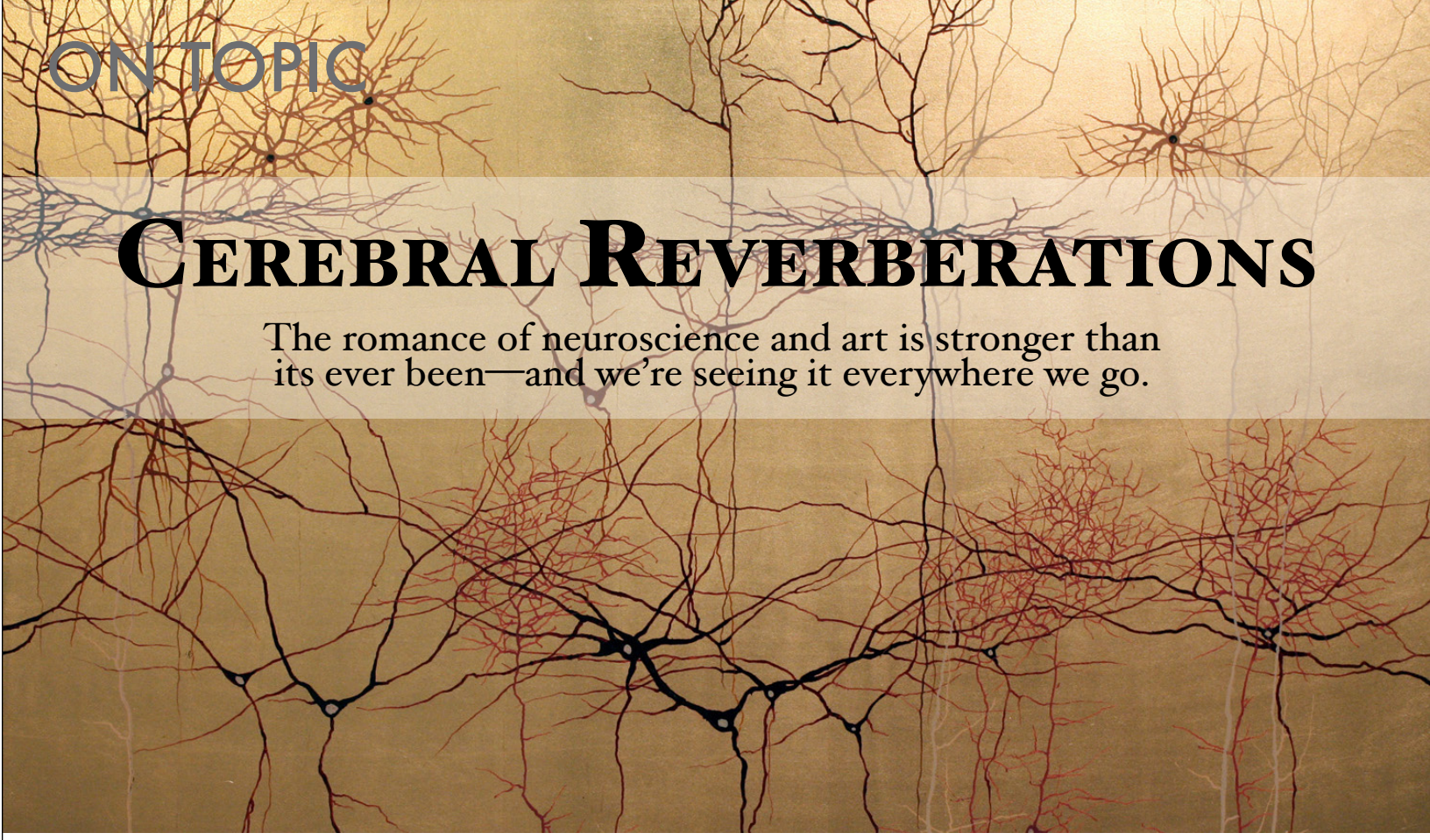
Enjoy!

Sincerely,

Julia Buntaine,
Founder & Editor-in-Chief

Cerebral Reverberations

The romance of neuroscience and art is stronger than its ever been—and we're seeing it everywhere we go.



Courtesy of artist Greg Dunn.

By Neel Patel
Managing Editor

New York City's Times Square is a sight to behold—a 21st century spectacle where the bright lights and brilliant colors flash and pulse like the crowds and characters flooding the pavement below. Last November, if you happened to find yourself wandering around Times Square a few minutes before midnight, you might have seen a projection of wiry imagery streaked in a rainbow flourish, stretched across the screens moving down the streets. It was Noah Hutton's *Brain City*: a three-minute short film that mined images of neurons from several different neuroscientific projects and compiled them into a reel that envelops the viewer in a complex system of brain circuitry.

The human brain is one of the most intricately designed organic structures to ever evolve out of nature. It's composed of 86 billion neurons and a roughly equivalent number of non-neuronal cells, with trillions of synaptic connections firing between them. The physical structure as a whole is divided into two hemispheres that are further divided into a multitude of different parts and regions, all playing a crucial role in the conscious and unconscious processes that keep the body alive and kicking.

In fact, the human brain actually resembles a work of art—a marvel of emergent complexity that allows an individual to perceive the world, keep and recall memories of past experiences, anticipate the future, and be aware of its own fragile existence.

And yet we only have a cloudy understanding of what it looks like. The brain is still, despite all the progress neuroscience has made, a kind of spectral blur. This is especially true at the microscopic level, where the entangled brain circuitry appears like a convoluted thicket of jungle plant life, with branches and vines and green appendages sprawling out in every which way.

But the visualization of the brain is not just an area of question for neuroscientists alone. Artists, especially this century, have created phenomenal works that turn the confusion

of the brain into visual pieces that provide thought-provoking attempts at answers—or dig deeper and ask more questions.

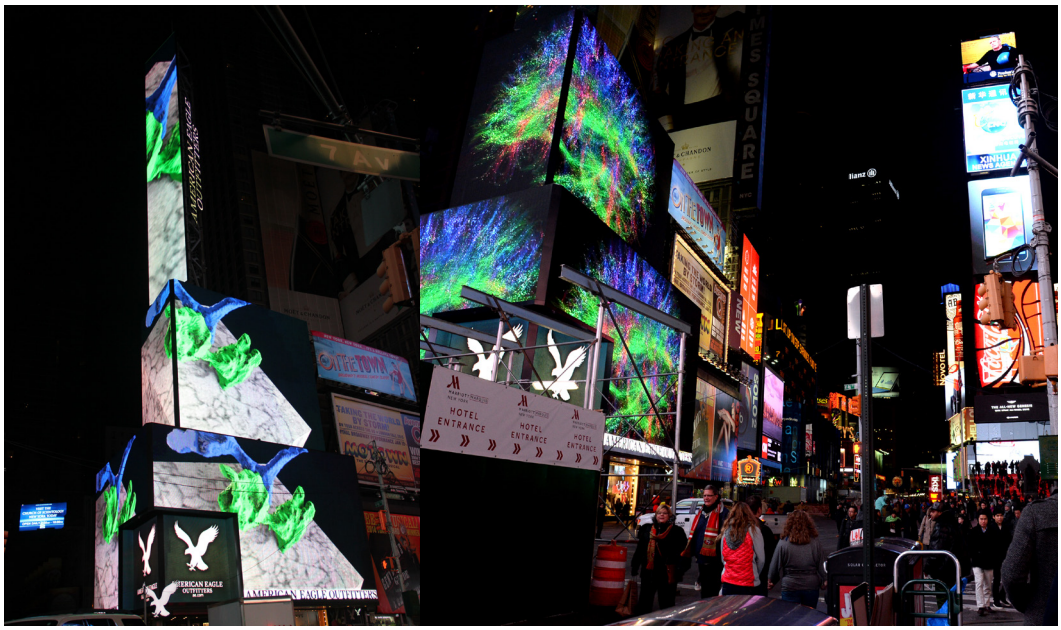
"This is a phenomenal time for discoveries of the brain," says Patricia Maurides, an artist and adjunct professor at the Carnegie Mellon University School of Art. "I believe many artists are naturally drawn to this work, because it offers us insight in who where are, what is 'the self', how do we perceive, how does memory happen, [and] what happens in an atypical brain." Just last fall, Maurides curated an exhibit called "Neurons and Other Memories" in collaboration with CMU's Center for the Neural Basis of Cognition, showcasing works by more than a dozen artists who had incorporated some type of neural and brain imagery as part of their artwork.

For Maurides, the work she and other artists do involving neural imagery ultimately explores 'what it is to be human'.

The visualization of neural circuitry in art is generally thought to have started with Santiago Ramón y Cajal, a Spanish pathologist and neuroscientist from the late 19th and early 20th centuries. He made several contributions to the field of neuroanatomy, winning the 1906 Nobel Prize in Physiology or Medicine for his research into the structure of the nervous system. Most notably, Ramón y Cajal's experiments provided definitive evidence for the 'neuron doctrine': the concept that the nervous system is made of discrete individual nerve cells that operate as part of a contiguous system—not as a single, linked network.

Like every great life scientist who came of age before the advent of photography, Ramón y Cajal was skilled at sketching his observations, creating detailed drawings of the neural structures he saw under the microscope. An aspiring artist as a child, Ramón y Cajal applied a technique that used silver nitrate to stain neurons, creating clear images of neurons against a yellow background. He drew hundreds of reproductions of various nerve cells and other features of the nervous system.

Even outside of a scientific context, Ramón y Cajal's drawings are an exquisite example of talent and aesthetic skill. They have been a powerful influence to those artists who engage with neural imagery. Rebecca Kamen, an artist and professor emeritus from Northern Virginia Community College, recalls how she felt struck the first time she saw Ramón y Cajal's drawings—specifically his signature drawing of the retina. "I could feel something literally shifting from looking at them," she says.



Images courtesy of artist Noah Hutton.

But as the 20th century progressed, scientists quickly jettisoned hand-drawn sketches for more accurate imaging techniques, and photography became king. Art, however, is not restricted by the goal of scientific accuracy, and any artist looking to visualize neurons and related physiology was free to move through whatever medium they fancied.

We might see one of Ramón y Cajal's heirs in Greg Dunn, a neuroscientist and artist whose paintings of neuronal structures are adorned in a cerebral beauty and emotional grip that recalls

Courtesy of artist Greg Dunn.

Ramón y Cajal's drawings. His gold leaf-based artwork makes use of a limited color palette that boldly highlights structural parts. Dunn takes cues from Asian art—in particular, the minimalism that flourished in the Rinpa School in 17th-century Japan. "Neural forms and Asian painting styles collide in a completely natural way," Dunn told Hutton in a 2011 interview for the neuroscience and art blog *The Beautiful Brain*. "Neural forms are naturally elegant and spontaneous, characteristics that also describe the more traditional forms of Asian sumi-e paintings—branches, grasses, etc. All that is required to connect the dots is the realization that you need to crank down your awareness to the micron scale to see that nature has very similar forms across different scales of magnitude."

"The branching form of a dendrite is nearly identical to the form of a branching tree, a series of cracks in the pavement, the movement of rivers and streams as viewed from space, or a lightning bolt," he says.

A good example of Dunn's technique is *Cortex*, a 2009 painting that uses enamel on composition gold leaf. The painting shows the layered structure of the cerebral cortex, the brain structure that processes sensory and motor information. In just a few colors and several thin lines, the viewer could easily mistake Dunn for reproducing the bare branches of a group of trees in the winter.

Dunn's paintings evoke the feeling that one isn't simply looking at a neuron—it's a structure whose design is found everyone else in a nature. "I wouldn't be surprised if the form were represented on a cosmic level as well," he told Hutton. "It is a fractal solution to the universe."

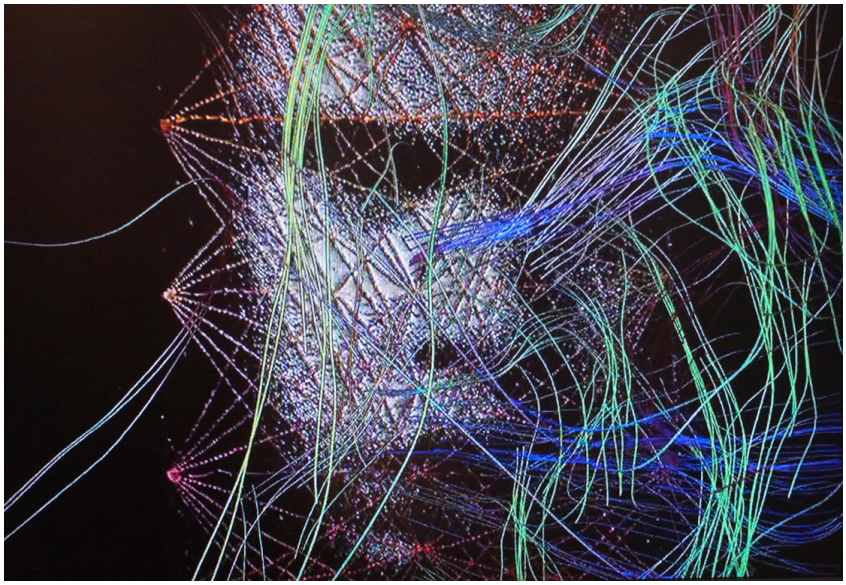
Dunn is not the only artist to observe that the structure and design of neuronal components can be found in other parts of the natural world. "Individual scientists deal with such a small aspect of a big larger picture," says Kamen. "As an artist, I'm like a hawk: I get high above and get to see how these different scientific fields intersect with each other." The focus of her artistic work, she says, is in building bridges between these different communities and discovering how they connect.

For instance, "If you look at the structure of the universe," says Kamen, "it is the same complex system that we find in the brain. In my world, there is this really profound interconnection between the structure of the universe—the cosmic web—and this neuronal web we have in the brain."

Courtesy of artist Rebecca Kamen.

Kamen's work uses a heavy degree of physical layers. In a sculpture entitled *Energy Landscape*, Kamen explores a web structure inspired by neuronal networks as they relate to the folding layers of a protein at a molecular scale. At the same time, she observes that this structure "also looks like what's happening in a black hole... there are so many similarities that happen between the micro and macro level, but most people don't get to see them. Once you start seeing these relations and connections, everything starts making incredible sense."

"I'm able to use my work to visually connect these things," she says. Like Dunn, she calls them 'fractal systems', which reappear in different scientific disciplines. In that way, visualizing neuronal structures can illustrate the clear relationships different sciences share.



Images courtesy of artist Lia Cook.

Some artists, however, prefer engaging directly with the images and data borne out of neuroscience research, creating less space between the science and the artist.

A few years ago, Berkeley-based artist Lia Cook was most interested in what neuroscience could say about reading faces. She kept finding that people had such a stark emotional response to her woven faces artwork, made from cloth materials. "When they discovered it was tactile, that did something in the brain for them to respond to it," she says. Cook was moved to start investigating the neuroscience behind the viewer's emotional responses and to map them as they occurred.

In an artist residency at the University of Pittsburgh School of Medicine, Cook began using Diffusion Spectrum Imaging (DSI) and TrackVis software from Harvard to trace the images and fiber connections in the brain as these emotions flare up. She then superimposed this data onto constructions of woven faces themselves, creating works where the viewer wasn't simply looking at the original piece—they were also looking at what was, presumably the same neural activity happening within the fiber connections happening in their own head.

"As part of this process, I started discovering this imaging of the brain that I thought I would never do," says Cook. "I'm interested in both the scientific answers and also creating my own artwork with this experience."

Cook's work has drawn her closer to the research realm than she anticipated she would ever get. By contrast, Noah Hutton uses the

swath of data and imagery he has access to and transforms this information in a way that makes brain and neural imagery easier for the common person to navigate and understand.

For *Brain City*, the three-minute Times Square film was just one of three parts of the project Hutton worked on. Another part involved printing images on construction banners in Times Square that comprised one-half landscape imagery and one-half brain imagery ("Like where a highway would turn into a cell membrane"). The last part was an interactive website where users would click on a region of the brain and be connected with a related landmark or location in New York City ("You click on the auditory cortex, and you'd be redirected to a music venue, or you click on stress regions in the brain, and you'd get a listing for accountants").

But Hutton is already tied to an even more ambitious project. He has been working for six years now on a documentary about the European Union–funded Human Brain Project (originally the Blue Brain project). Every year, he flies out to Europe for a week or two to get exclusive access to footage and interviews for the documentary—as well as conversations with some of the project's sharpest critics, who deride the whole endeavor as a pipe dream. The project is slated to finish in 2023, and Hutton hopes by then to have a film that's ready for screening as well. "For me, their success is just as interesting as their failure," says Hutton. "They have such ambitious goals to understand the human brain and simulate it. If they can't do it, it will still be exciting to look at as well."

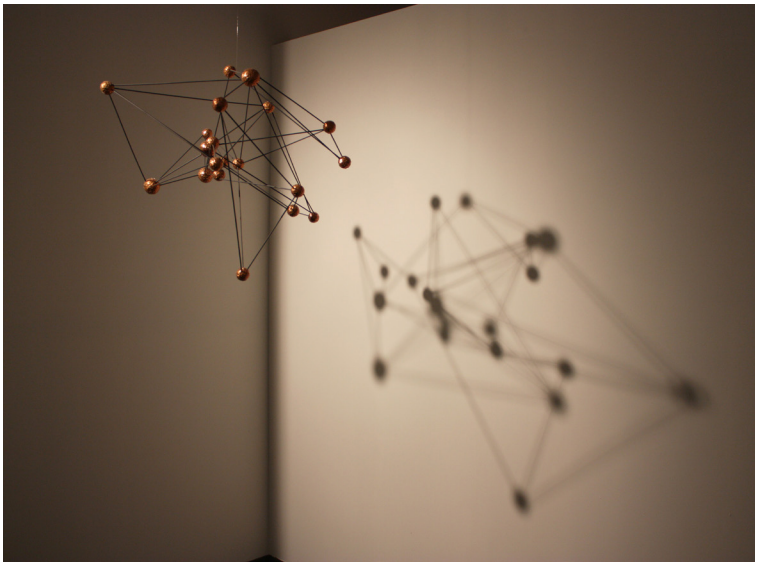
For Hutton, mapmaking is a perfect analogy for what these neuroscientists are doing in their work. "The loftiest goal I can hope for with the way I use imagery in my work is to show people new landscapes," he says. "To remind people that these are physical structures, and that these are maps—with aesthetically chosen colors" and other creative decisions being made, "just like in cartography."

The role of scale is also something that Hutton is conscious about when it comes to visualizing neural imagery. "We're so used to watching any kind of videos on small little screens," he says. "The Times Square piece was an opportunity to make those images huge." In projecting those visuals on such a grand scale, it was an opportunity to connect the "feeling of awe and wonder with the night sky, with the complexity of the brain. That visceral effect can really only be achieved when you feel smaller than the image you're looking at."

Moreover, in working with a moving medium like film, Hutton believes he can get viewers to feel "like their moving through a landscape. It's immersive." Hutton likes to visualize the imagery as a travel through a dense setting, suspending the viewer's disbelief for a moment. "That's something video can do in a way that a still image of the brain couldn't."

"At its best," Hutton says, "this kind of work can provide an emotional connection to the imagery. And once you have that connection, you might interact with the science in a new way. For me that's the reason this work is important—to share that feeling of awe and wonder."

Courtesy of artist Julia Buntaine.



Images courtesy of artist Julia Buntaine.

What may be the most compelling segment of neuroscience-based art, however, are the pieces from the artists who visualize the brain and neural networks as a way of tackling questions in neuroscience directly—in ways that cannot be done within the lab or a clinical setting.

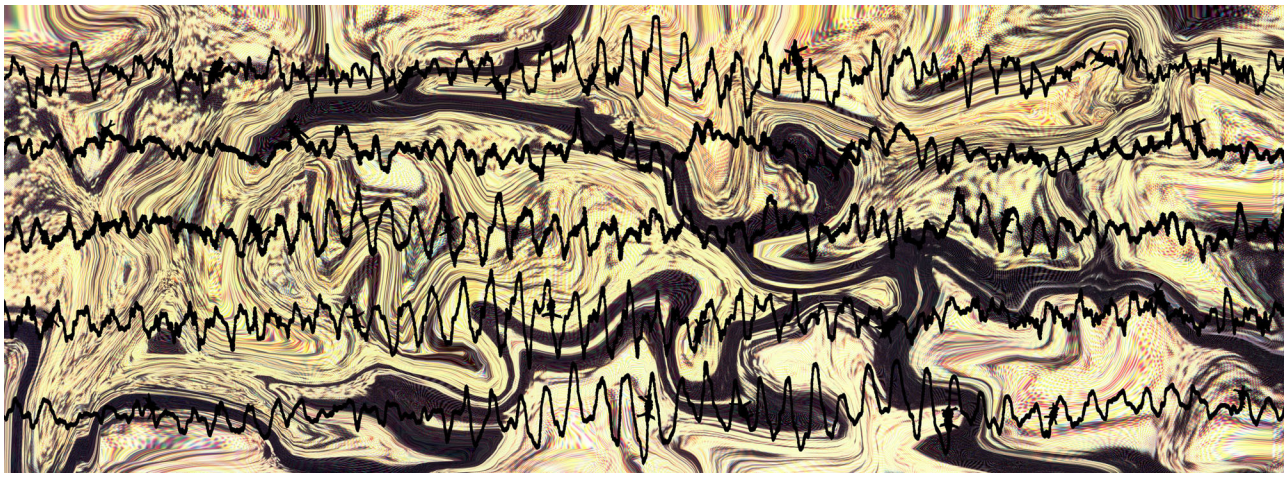
As a student at Hampshire College, New York City artist (and, full disclosure, *SciArt In America* editor-in-chief) Julia Buntaine walked into her first neuroscience class and found that "something clicked. Studying the biology of the brain was refreshing for me—to really thinking about the brain and the self in a concrete, objective way." As she began to debate whether she wanted to concentrate on art or neuroscience, she realized that "neuroscience as a subject for my art was the perfect solution."

Buntaine works in all mediums, building out of the concept first. When it comes to her 'biological' work, she usually starts with a physical form, such as a brain, or a motor neuron, or protein. There are also her 'data' works, which take a look at "the ways that we visualize the brain," such as EEG, fMRI, computational networks, and other neuroscience tools and techniques. And then there are her pieces which address the history and practice of neuroscience as a discipline.

Lastly though, she looks at the 'theories' of neuroscience, in which the artwork explores ideas and hypotheses about the brain that have not yet been solidified and proven as true or false. For example, in her work *Raw Feels*, she addresses the idea of qualia, or the subjective aspect of consciousness. (What is the feeling of the color red?) Part of the larger discussion on consciousness, the existence and mechanism of qualia remains hotly debated.

"I have noticed that the way I make my work is a lot more like the scientific process than the sterotypical artistic process," says Buntaine. It's not the chaotic experimental process that is so popularized in the cultural glimpses of the art world. Instead, Buntaine "figures out the question or topic, and then figures out how to investigate and visuzalize it," applying a controlled step-by-step path that shares a lot with the scientific method. "I think that has to do with how close I was in the science while I was in academia. Having actually carried out scientific studies and written papers during my undergrad has affected how I might approach neuroscience questions in my own art." The luxury of being an artist, however, means that Buntaine can, as she puts it, "explore those questions in my own weird, artistically motivated way."

In her piece called *Small Worlds*, Buntaine takes inspiration from the "Small World Network" developed by Strogatz and Watts in 1998. Imagine a spectrum that has a chaotic left and an organized right. The small world network, as a mathematical property, exists on a specific part of the spectrum, which contains both chaos and organization. Out of context, the installation just looks like a series of strange balls and sticks connected to one another. But, taking into account Strogatz and Watts' idea, the three-dimensional figure is representative of how small world networks exist within systems like voter networks, metabolic processing, social networks, and more—including neural networks. In this instance, neural imagery isn't visualized as it physically exists, but rather is shown a form that demonstrates how it is thought to operate under certain notions. For Buntaine, this piece is "a pretty good illustration of my artistic process."



Courtesy of artist Audrius Plioplys.

Someone with more experience traversing different lines of work is Audrius Plioplys, an artist and retired neurologist based in Chicago. As a young man, Plioplys says he "realized I was making a fundamental error in looking at neurology and art as two different worlds. For over 30 years now, I've been very actively combining neuroscience questions in my artwork—investigating how the mind works and how the brain works, outside of the confines of clinical research and laboratories, and in an art studio." Above all, Plioplys wants to know "what is it that makes us human beings?"

Plioplys' work has evolved over the years, from early drawings and acrylic paintings on paper into digital photography and images that can be swiftly moved and modified. Plioplys allows his artistic work to dig deep into ideas that float around in neurotheology—the way religious and spiritual experiences can be explained in neuroscientific terms. These notions don't fit well into his work as a scientist and physician, but as an artist, they are ripe for exploration.

Like Kamen, Plioplys is obsessed with working through layers. "Our brains are composed of layers—it's very much a layered phenomenon," he says. Those layers lend themselves towards fostering complex thought processes and emergent systems. Plioplys explores this trait through Photoshop, working with hundreds of different layers of images. The process, he says, "is in keeping with how our brains work."

Plioplys' latest work, *Siberia Souls*, comprises a set of diptychs presented as three-dimensional light sculptures. They are illuminated by LED light systems ranging from static white to color-changing, as a way to parallel "our own brain functioning," say Plioplys. "The left hemisphere is analytical, black and white, and the right hemisphere creative, colorful." The diptychs incorporate photographs and letters belonging to departed individuals, with layers of the artist's own neural networks, brain scan images, and brain wave tracings representing the "three layers of our own thought processes: conscious, subconscious, and unconscious."

"In putting in these ghostly images of these departed individuals, I'm remembering them," says Plioplys. In the vein of neurotheology, he

is exploring the immortality of the deceased in memory.

Memory is an intensely strong motif found in much of Plioplys' work. In his "Memory" series, the artist's own MRI brain scan images and EEG tracings of his brain waves are incorporated within intense displays of color and complex wired systems. The pieces act as an almost vibrant foil to Dunn's more restrained (but no less beautiful) gold leaf works.

Plioplys isn't simply concerned visualizing the physical structure of the brain and nervous system itself. In series of works called "Symphonic Thoughts," he used EEG tracings of his brain waves taken in 1980 and integrated them as part of a set of digital prints he made from surreally transformed photographs imbued with a great deal of emotion and sentiment from his life—"just as the central nervous system transforms visual memories into complex and indecipherable neuronal networks and interconnections," he wrote in a description for the series. In *Chromodynamics*, Plioplys employs a rainbow scale of color as part of an exploration into what memory looks like or how it exists at a subatomic and level—certainly outside his realm of expertise, but a curious dive into quantum theory nonetheless.

Although Plioplys is a neurologist, he makes clear that he only seeks to explore neuroscience questions in his art and resists all persuasions to explore clinical ideas. "It was a privilege to treat patients for so many years. It's absolutely incorrect for me to use other peoples' suffering or pain in my art. I can't abuse that privilege—it's wrong."

"I've seen an explosion of neuroscience-based art in the last few years," says Buntaine. "I think it's because the brain's presence in the media has skyrocketed in the last decade or so." Very rapidly, there are a lot of artists reacting to that presence and, Buntaine thinks, "finding out how beautiful the brain is. While neuroscience still has a lot to figure out, the emotional power of the brain seems to still hold a huge power over scientists, artists, and every else in between. It's the most personal of the sciences. The brain gives us our experience of reality while creating our experience of reality."

"I rarely know where I'm going with my next project far in advanced," says Buntaine with a laugh. "It's pretty random." But this kind of foggy vision of the future seems to make perfect sense for this type of work. The human brain and nervous system is one of the great mysteries of the biological world. It's conceivable that humans might one day come to understand everything that is happening around them—and still have little clue to what's going on in their own heads. But that mystery is what drives both artists and scientists toward exploring these questions, in their own way.

Courtesy of artist Audrius Plioplys.

PREVIEW

PRESS RELEASE // Lafayette College:

Frankenstein 2029 is an immersive visual arts, theater, music, dance, film, and media experience based on Mary Shelley's gothic novel that challenges both the boundaries of live performance and what it means to be human in an ever-accelerating technological world. Meander through Shelley's bedroom. Explore Walton's ship and observe its intrepid crew. And tread carefully through Victor Neurotech's lab and spy their latest inventions. Or shadow the Creature itself (not too close!), as it ventures through the venues and unpredictably interacts with audience and cast alike. The brainchild of art professor Ed Kerns of Lafayette College, *Frankenstein 2029* embodies the College's mission to infuse the arts across the curriculum and drive true cross-disciplinary collaboration. Over eighty students, faculty, staff & alumni have fused their expertise in neuroscience, art, chemistry, computer science, engineering, English, neuroscience, theater, and more to bring *Frankenstein 2029* to life. "With this production, we're tackling the big, transcendent questions facing us all: the nature of humanity's connectivity, the impact of socio-economic and gender inequalities, the ethics of extending life, and most especially technology's current and future role in our lives," says Kerns. "How will we be changed, individually, collectively, by these issues?"

For more information on the April performance and to purchase tickets, visit: *https://sites.lafayette.edu/frankenstein2029/*

FRANKENSTEIN 2029

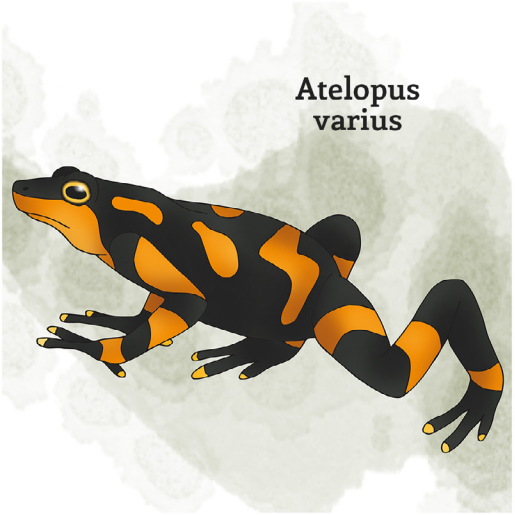
SO LONG, FAREWELL:
Extinction in the Anthropocene Era

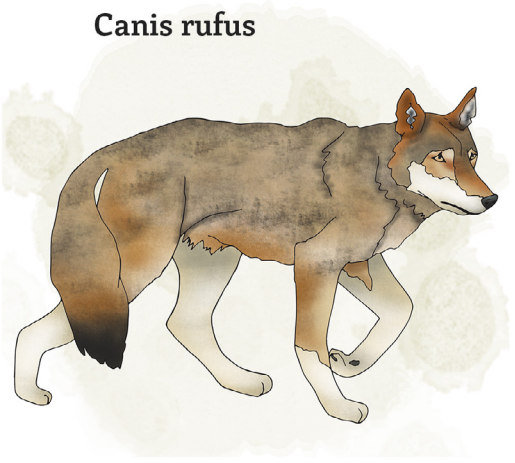
So Long, Farewell Installation View (2015).
All images courtesy of the artist.

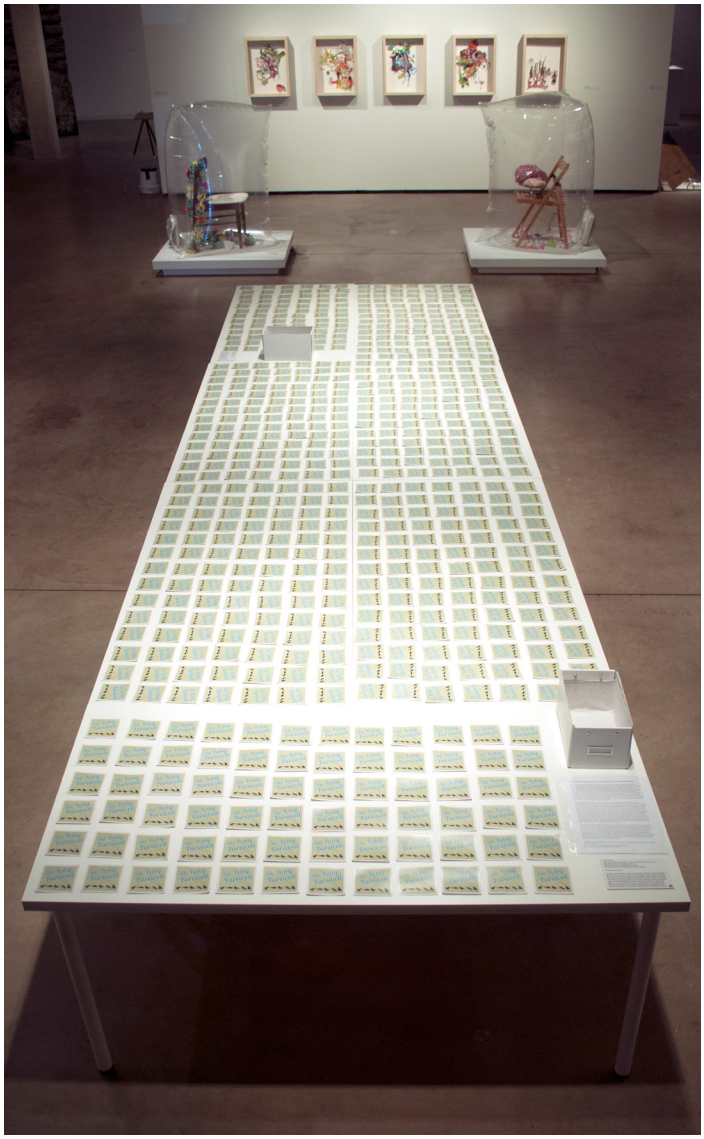
Artist Statement

So Long, Farewell: Extinction in the Anthropocene Era is a memory card game featuring animals from North and South America labeled as extinct in the wild or critically endangered by the International Union for the Conservation of Nature (IUCN) as of December 2014. In the game, cards are placed face down and players try to find matched pairs by turning over two at a time, remembering their location and name. Focusing on mammals, birds, reptiles, fish, and amphibians, the game has 320 species and 640 cards total. *So Long, Farewell* is unwieldy and virtually unplayable without deep concentration and focus—something desperately needed now to stave off calamity. Using this traditional children's game underscores the fragility and overwhelming devastation of the mass extinction we are approaching (and causing). Furthermore, several of these species are already forgotten or barely known; through careful research, my illustrations are based on color photographs, fragmentary descriptions, and in several instances, a note stating their coloration in life unknown. In a way, *So Long, Farewell* serves as a memorial to these vanishing animals. The act of playing the game shows the enormous task at hand to prevent these mass extinctions, potentially including our own.

- *Daisy Patton*
www.daisypatton.com







Top: Card from So Long, Farewell (Antilophia bokermanni) *(2015). 3.5" x 3.5". Middle: Card from* So Long, Farewell (Atelopus varius) *(2015). 3.5" x 3.5". Bottom: Card from* So Long, Farewell (Canis rufus) *(2015). 3.5" x 3.5". Cardstock.*

SciArt Center of New York

Featured Member

Karen Ong

Synesthesia

This is a photo of Lauren taken by Karen using the free app 'MellowRoom' created by Jarrett Scott. MellowRoom is an app that adds real-time filters to photo and video. On the left, the photo filter created approximates what Lauren experiences when smelling Parmesan cheese (as shown in the picture).

Lauren Slivka and Karen Ong are pleased to receive the SciArt Center's Fall 2014 Grant on 'data visualization' for their project on understanding olfactory-visual synesthesia through analysis of fragrance paintings. Lauren Slivka is a perfumery trainee, olfactory-visual and auditory-visual synesthete, and amateur watercolor artist. Karen Ong is a graduate student in computational biology at New York University who dabbles in art, painting, and origami. They have been exploring the synesthesia and the intersection between art and science for the past year in order to inspire new art, learn more about synesthesia, and hopefully make a contribution to science in the process. What follows is a question-and-answer about their project, synesthesia, and the connection between science and art.

What is synesthesia?
KO: Synesthesia is a neuropsychological condition commonly described as a 'merging of senses' in which stimulation of one sense (such as sound or smell) automatically evokes a perception in an unrelated sense (such as vision or touch). According to the Oxford Handbook of Synesthesia, about 4.4% of the population is synesthetic. The most common form is grapheme-color synesthesia, in which letters or numbers induce the perception of colors. Many forms exist, including auditory-visual (in which sounds or music induce the perception of colors and shapes), sequence-space (in which numbers or dates evoke specific spatial locations), and lexical-gustatory synesthesia (in which hearing, reading, or saying words triggers flavor sensations).

Lauren has a rare and mostly uncharacterized form of olfactory-visual synesthesia, in which scents and smells induce the perception of colors, shapes, and textures in her mind's eye. According to demographics collected by Sean Day, the president of the American Synesthesia Association, only about 6.45% of synesthetes have odor-vision synesthesia. However, we are anecdotally aware of multiple perfumers who may have some form of synesthesia, including the famous perfumer Frederic Malle. Lauren also has auditory-visual synesthesia, in which music or sounds trigger visual images, colors, and shapes.

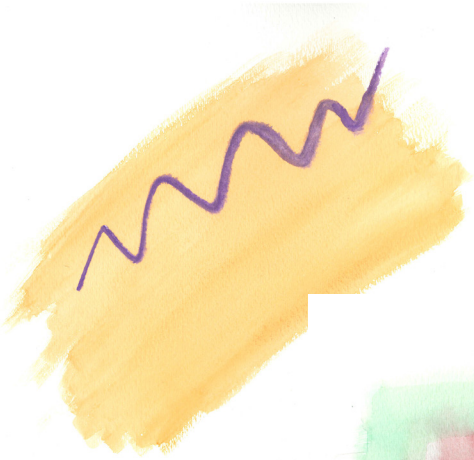
LS: Synesthesia occurs when different senses combine. I have synesthesia and experience sounds and smells as shapes, colors, and textures projected in my mind's eye. While this might sound disruptive, I have always perceived the world this way, so it is normal, for example, for me to not like someone's voice because it sounds like the smell of blue cheese. When I hear music or smell perfumes, I also see colors and shapes. For example, when I smell the fragrance "Carnal Flower" by Frederic Malle, which has tuberose absolute, eucalyptus, jasmine, and coconut, I see a hazy, fuzzy sheer green background with sheer burgundy rectangles throughout. When I hear the song 'Ur' by SZA, an alternative R&B singer-songwriter, I see a watery reddish-orange background with a lattice of small brown tubes at the bottom. There can also be interference between sound and smell. This can be useful in situations such as concerts, where you don't want to smell anything, or walking near the Gowanus Canal (a thin cesspool of a canal that runs through Gowanus, Brooklyn and smells like an unwashed reptile house).

What is your project?
KO: Lauren and I are exploring the question, "Is there a connection between the synesthetic visual experience caused by a scent or fragrance and some property or properties of the fragrance itself?" At the current moment, we are focusing our energies on figuring out a way to quantify Lauren's synesthetic perceptions. Because she has two forms of synesthesia (auditory and olfactory) that generate very similar perceptions of color, shape, and texture, we are also using music to work on understanding and characterizing her visual perceptions.

LS: My goal with this project is to see if there's a pattern to my perceptions. What causes something to smell purple? What causes something to sound acidic (a pointy texture with an associated perception of acidic taste)? How can different songs all have the same color scheme? Why can I see colors in my head that I've never seen with my eyes?

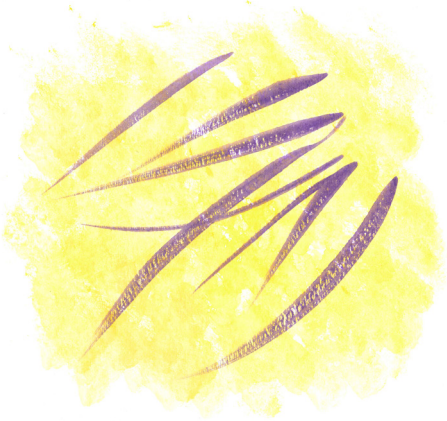
How did you become interested in studying synesthesia?
LS: I first met Karen as a tutor. She had guessed that I had synesthesia before meeting me, as she'd heard that I work with fragrances. So we decided to do a project about my synesthesia, and quickly discovered that there wasn't anything written about olfactory synesthesia, and very little about auditory. Karen had previously met a scientist who works in olfaction, and so we went to Yale to learn more about olfaction. I gave a presentation about my olfactory synesthesia, and the scientists there suggested a variety of projects for me to explore my synesthesia in more depth.

KO: I always loved popular science books and so encountered descriptions of synesthesia in high school or before. However, it wasn't until college that I actually encountered a synesthete in real life. A classmate asked to borrow my chemistry notes, and upon realizing they were color-coded by concept and keywords, complained loudly that my colors were "all wrong." It turned out that the colored words clashed with her color-letter synesthesia. Another good friend of mine has multiple forms of synesthesia, including auditory-visual and olfactory-visu-



"La Perfume De Therese" (perfume by Frederic Malle) is an effervescent and lively fragrance with notes of plum, melon, leather, and tangerine. It is a sheer thin suede orange background with a fuzzy purple streak.

"Carnal Flower" (perfume by Frederic Malle) is a fragrance with notes of tuberose absolute, eucalyptus, jasmine, and coconut. It is a hazy, fuzzy sheer green background with sheer burgundy rectangles throughout that repeat randomly in an infinite pattern. The texture of the painting is delicate, gauzy, and sheer.



"Un Fleur de Cassie" (perfume by Frederic Malle) is an elegant, sharp, unusual fragrance with notes of mimose, carnation, jasmine, and cassis. It smells like a powdery, unevenly yellow thin suede-like background with a few large purple streaks.

al and olfactory-auditory synesthesia. She would cook by adding spices until her food sounded like a symphony, and occasionally created art-themed foods, such as a cheesecake flavored to reproduce the color scheme of Van Gogh's painting *Starry Night*. When I am with her, I have to adjust my behavior, as doing something as small as clicking a carabiner absentmindedly might cause everything to flash blue. I realized we lived in incredibly different subjective realities, something I found both personally and scientifically fascinating. As I read and learned more about synesthesia, I got better at recognizing it in people and ended up discovering that several of my friends and acquaintances likely have some form of synesthesia.

So when I heard that Lauren—a perfumery student just out of high school—had managed to beat multiple experienced perfumers for a job, it wasn't much of a leap to guess she might have some kind of olfactory synesthesia in addition to having a very sensitive and trained nose. I am pleased to say I was right and that collaborating with Lauren ever since has been both a privilege and a pleasure.

How are you using the SciArt Center Grant?
KO: We used a portion of the money to buy art supplies to create sample paintings of synesthetic visualizations. Lauren is in the process of creating a series of artworks depicting her synesthetic experience of fragrance. In particular, she is choosing perfumes that she enjoys, that produce vivid and aesthetic visual imagery, and that illustrate the range and variety of colors, shapes, and textures she experiences.

On the other hand, I am trying to figure out how to quantify these in a way that is reproducible and consistent. How do you quantify a color or shape? Can we reduce these pieces of art to a series of numbers that represent color, shape, texture, size, or pattern in a way that is satisfactory to both Lauren and myself? Quantification of visual imagery has turned out to be a greater challenge than I had imagined upon starting this project. However, being able to see Lauren's art and discuss how she perceives it has been enormously helpful.

I am working on obtaining approval for human subject research so that we can actu-

ally perform experiments to explore the link between olfactory-visual synesthesia and fragrances in a systematic way. However, it has been a difficult and time-consuming process, and we don't expect to get approval for several months. In the meantime, we have consulted with scientists at Yale who study olfaction and/or synesthesia regarding possible experimental study designs and ideas of questions to ask and things to test.

Questions for Lauren on Synesthesia and Perfumery

How did you learn you were synesthetic?

I discovered I was synesthetic at a young age. I remember telling my mother that a song was 'too pink'. When I was a bit older, I read the book *A Mango-Shaped Space* (a young adult book by Wendy Mass about a girl with synesthesia) which put a name to my experiences.

Can you describe an unusual synesthetic experience?

One time, I was sitting at one of my favorite restaurants, Cafe Rue Dix. I was there with my friend. It was one of the last nice days of summer, so all the windows were opened. They were playing a Michael Jackson song, ordinarily a nice shade of blueish-greenish black. I ordered an iced latte. I took a sip of the latte while the song played. Usually, I wouldn't have been able to smell it due to the loud music. But the sound and smell combined, and I saw very vividly a giant cobalt blue zig-zag in front of me. I immediately drew a picture of it. I was excited that the smell and sound had combined, instead of the sound canceling out the smell. I felt invigorated.

How does auditory-visual synesthesia affect your experience of music?

My aural synesthesia influences what music I like. I enjoy music with cool, smooth, watery textures, or music with hard geometric textures. I don't like music that sounds what I can best describe as 'carbonated'. I also hear colors that I don't see, such as blueish-black. It's different than combining blue and black. It's a distinct color.

Has synesthesia helped you in perfumery?

My olfactory synesthesia has been of great assistance in perfumery. Last year, I worked at a fragrance company where I was to smell fragrances and categorize them by various words to describe them (i.e. cool, warm, creamy, dry). The colors, shapes, and textures of the fragrances would help me to remember what they were.

After working as a perfumery trainee, I took a class at Pratt Institute on advanced perfumery. The teacher was a fragrance evaluator. He showed us hundreds of fragrance components, ranging from synthetic, individual chemicals to natural components. My synesthesia aided me in learning the difference between similar smelling chemicals, such as C-10, C-11, and C-12, which are part of the aldehyde fragrance family most famously used in vintage formulations of Chanel No. 5. These three particular chemicals all have a similar fuzzy, effervescent, sweaty feel to them.

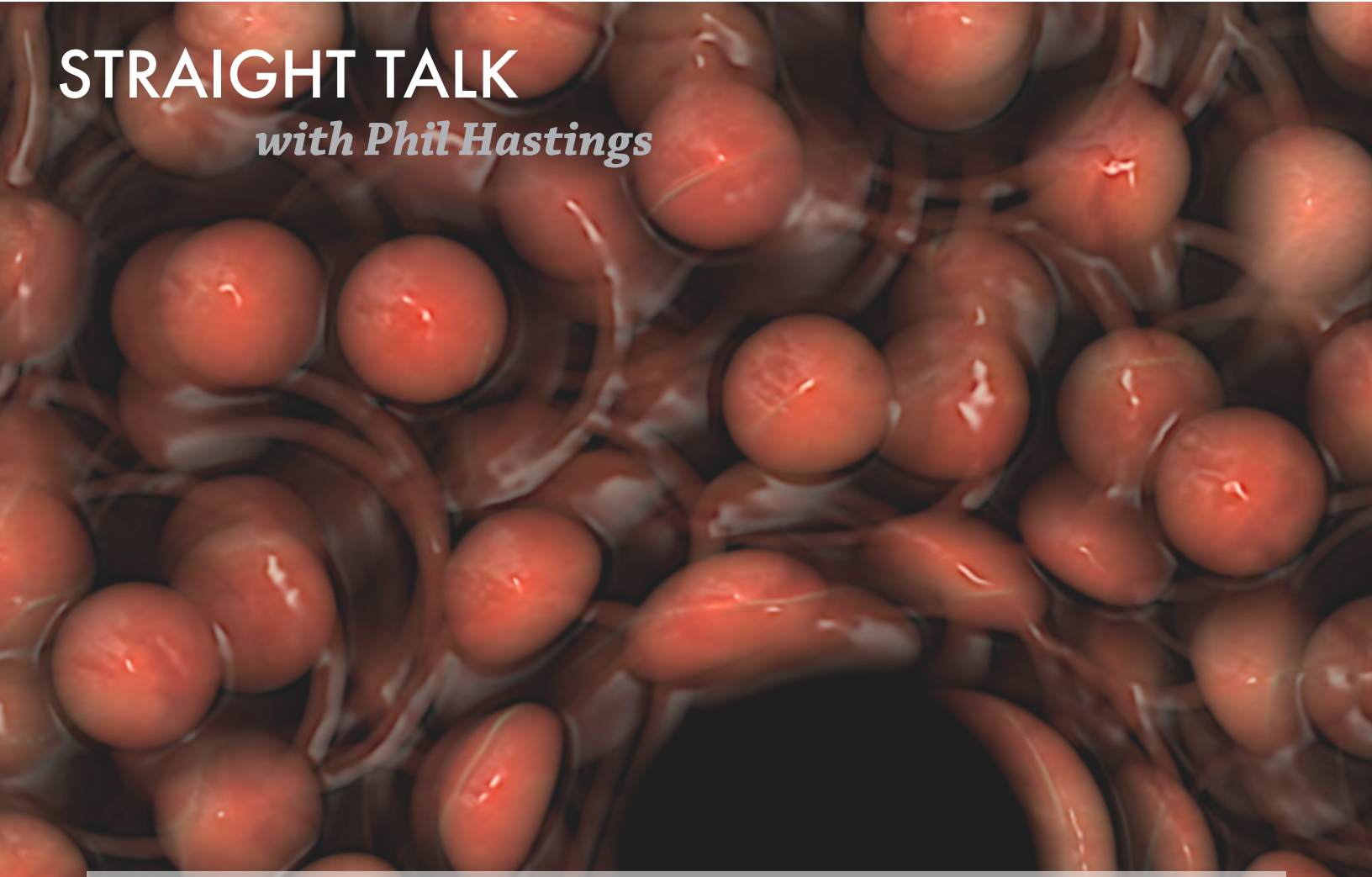
To me, C-10 is orange, C-11 is green, and C-12 is blue. I can smell one of them, note the color, and know what chemical it is. Unlike most people, I can skip the step of forming associations with each chemical, so I learn the components quickly. However, when I'm smelling a smell and can pick out the individual components, it's actually the training, not the synesthesia that allows me to do it. In a sound, even if you are not familiar with music, you can tell the notes apart. But if you're not familiar with smells, a perfume will smell like one monolithic scent. An untrained person likely won't be able to pick out the different facets in a fragrance. Synesthesia only gives me an edge in learning fragrance notes, not in decomposing them into their components. That part takes training.

Has your synesthesia ever been a problem?

At my job, when I was trying to smell fragrances, people would loudly play heavy metal music, very carbonated and acidic. I couldn't smell anything when they were playing this music. So I had to close the door. It's like having a cold when there's loud noise. I can't identify smells. I can get a very faint whiff of them but can't identify anything.

Karen Ong is a member of SciArt Center, an organization dedicated to bringing scientists and artists together for a common cause. To learn more about SciArt Center and their membership, visit *www.sciartcenter.org.*

STRAIGHT TALK
with Phil Hastings



By Julia Buntaine
Editor-in-Chief

JB: *Science and film share the quality of recording natural phenomenon. As a filmmaker, what about scientific topics and nature inspires your cinematic eye?*

PH: I am drawn to many things in science and nature, but two fundamental concepts that inspire my work are movement and transformation. On a very basic level, it's because these two concepts are best understood through the moving image. Locomotion of animals fascinates me, especially when looking at small-scale locomotion of insects and arthropods, mollusks, and other aquatic creatures; they all engage my sense of wonder. I remember watching time-lapse and high-speed films shot by Oxford Scientific Films as a child and being amazed at what this group was documenting. At that time, this type of work was rare and extremely difficult to produce. I am also influenced from childhood experiences. Growing up on a small farm, exploring the abundant nature around me, seeing the life cycle process in everything, and having a father who taught biology and environmental sciences, all form a solid foundation for the imagery that I am interested in and create. Ultimately, it's about understanding our relationship in and to the universe.

JB: Y*our piece* Sexual Cannibalism *features the notorious drama of praying mantis reproduction. Despite its familiarity in concept, the film is truly terrifying to watch and creates a palpable amount of suspene. What was your experience making this film? Did you learn anything you didn't expect to or encounter any problems or surprises?*

PH: The *Sexual Cannibalism* video was a lot of fun to work on. It was also a labor-intensive project that required a lot of patience and problem solving. There was a strong

Untitled - Video Still, Threshold Series (2013 –Present) Dimension Variable, High Definition. All images courtesy of the artist.

Phil Hastings is an artist, filmmaker, and associate professor at SUNY Fedonia. Creating work that surrounds various themes in science, Hastings has shown his work internationally, is a 2012 NYFA Film/Video Fellow, and was included in the 18th biennale of Sydney, Australia.Hasting's work has also been lisenced by National Geographic and the Canadian Broadcast Company. You can find his work at *www.philhastings.com*.

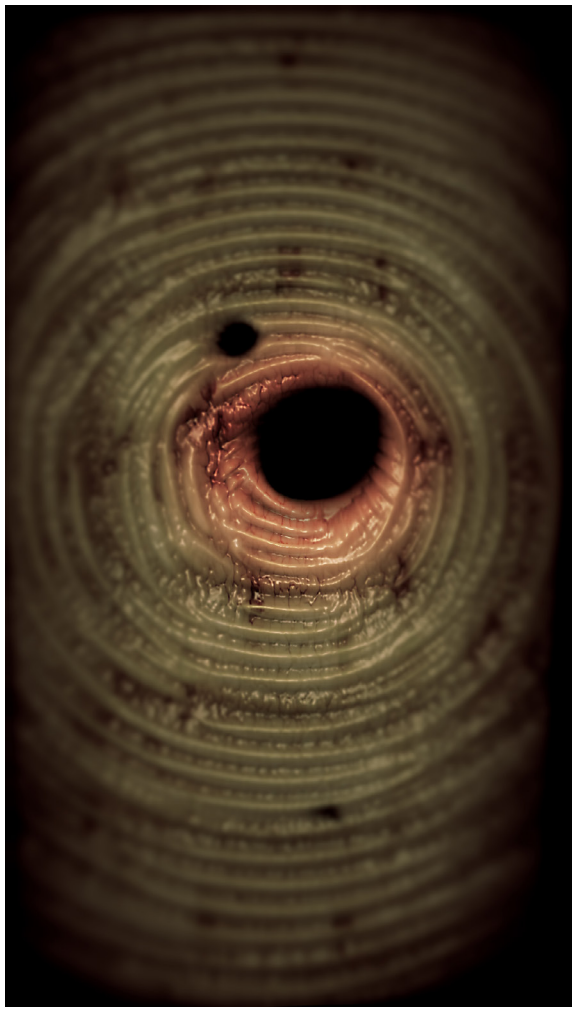
desire to not artificially influence the behavior of the mantises for the sake of the video, and the mantises' personality is very determined. The old film saying that you should never work with kids or animals because they are unpredictable certainly held true for this project. The mantises had a will of their own, which typically meant that I would set up a shot with cameras, monitors, lights, et cetera, and then introduce the first mantis into the scene. Of course, as soon as it was out of its holding cage, it would take off down the support that it was to hang on in front of the camera, crawl onto the stands holding the support, sometimes onto the lights, or, more times than I can remember, straight towards the camera, where it would sit on the top of the camera and stare at me with what I can only assume was smug sense of 'just try it'. I started to realize that the mantis would typically repeat their action, so if one mantis always took off to the left, I would release them much farther down to the right out of shot, so that by the time they settled down they were closer to where I wanted them. These particular mantises were being studied to determine how hunger affected predation and how or if the males were able to sense when was the best time to approach a female so they'd get to mate another day. The age of the mantises, time of the season—early or late in the season, their level of hunger—all played a part in how they behaved. There were many days when the male and female were introduced with no interest shown from either party for mating or eating. There were times when the male was lucky, and the female would not be interested in eating. On these days, I'd get a lot of material of the mating process, which was beneficial to the project. When this happened, I was able to spend a lot of time moving the camera around without really disturbing the mantises. However, at a certain point, you realize you've shot about all you can get, but the mating process could last a very long time. Four hours or more is not unheard of. So, a lot of my time was spent waiting for the mantises to finish so that I could return them to their cages.

One of the common misunderstandings is that the female eats only the head of the male but the female will eat the entire body of the male, and during that process if the male has successfully mated, he will continue to do so while being eaten. It was a fascinating process to observe and document. Because it is such a provocative subject, a lot of people and organizations have expressed interest in the material that I've shot. This has led to other interesting projects that have extended the life of the video and allowed me to meet some great people and contribute to a number of other commercial and creative projects.

JB: *Rather than filming natural phenomena, in your current "Morphologies" series, you are creating what you call video-based life forms. From orifices to organs and trilobites to starfish, these creatures take on a life of their own as they pulsate and travel in their virtual world. Can you talk a bit about this project, how it started, and where it's going?*

PH: Often when I'm creatively stuck or need a change in creative direction I will take a video clip and begin manipulating it in the computer. It's an action much like sketching or even doodling, a technique that allows me to explore at an unconscious level. Often the results are abstractions of ideas that I'm working through, processed in a new way. As I was digitally manipulating some of my raw video files, the abstract images began to manifest in a way that reminded me of organic creatures, small to microscopic in nature, but blown up large as if being observed and studied. Once I was able to key in on this idea, I began to manipulate the video imagery with specificity in mind, and the project took off.
As these ideas solidify, the video's manipulation becomes more complex and involved. This manipulation is much like genetic modification. I enter into the material at the most basic level—in my case, the pixel—and through manipulation, transform and alter the original data to create something new. This manipulation and shaping is done through the layering of filters on selected video clips and precisely animating the filters' parameters over time to construct the new imagery and bring the digital organisms to life. Each piece's outcome is realized through countless evolutionary steps in the modification process. While I could use three-dimensional animation for the morphologies, I prefer the limits of the video medium. This project has been more about the act of modification than creation. I can minutely adjust a specific parameter of one specific effect,, and a completely new and unexpected shape is formed. Often, these don't advance the design. There are hundreds of these morphologies that don't survive past the developmental stages and will never go beyond the software's timeline.

The subject matter of the recorded video files typically forms a conceptual foundation that I build upon. While the finished image may have no obvious visual correlation to the original material, the image has in its digital DNA trace elements of its ancestral beginnings, which provides more complex meaning in the final work. The specimens that I am working on right now all come from video that I shot of Lake Erie.



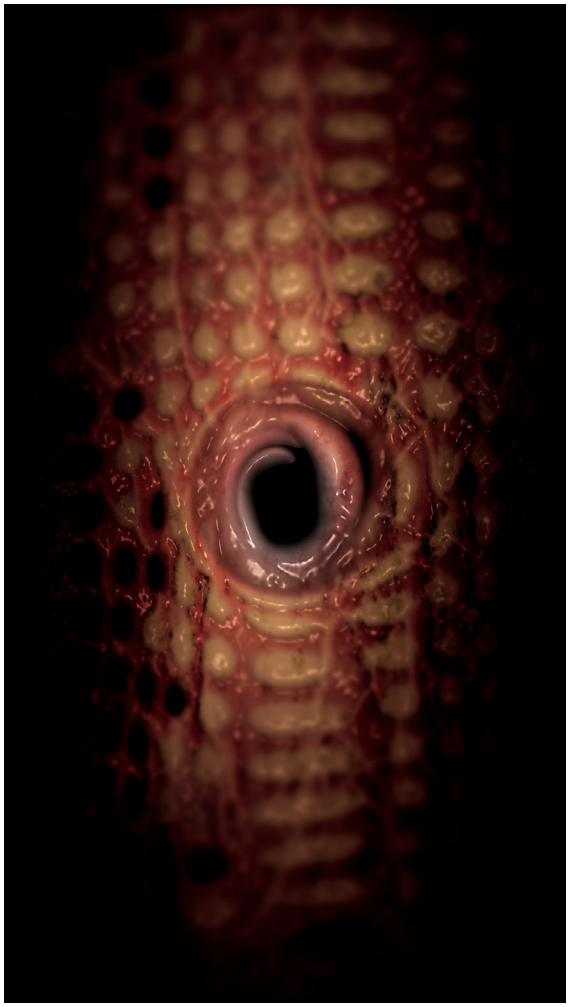
Untitled - *video still, "Threshold Series" (2013 – present). Dimensions variable. High definition.*

Untitled - *"Morphology S*
Dimensions variable. Arch

This series is developing in two parallel mediums right now. The videos of the morphologies will be displayed in small wooden cabinets that I am designing and constructing. These cabinets will reference historical

scientific apparatuses ranging from early curiosity cabinets to late 19th- and early 20th-century cases found in museums and classrooms. Digital and analog prints of the organisms will also be a major component of this body of work and will draw inspiration from classic academic scientific posters and early biological specimen etchings. Surprisingly, I've just recently discovered the book Micrographia by Robert Hooke and am finding it very interesting.

eries" (2014-present).
ival digital print.



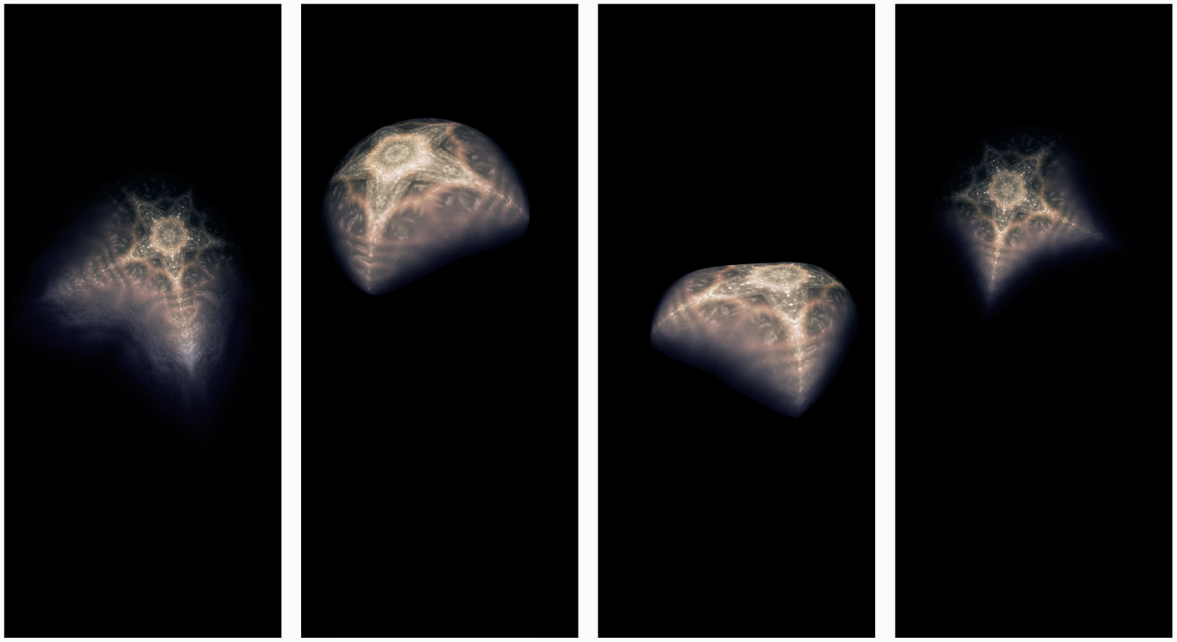
9.14.8.15.18.18.5.19.3.15 - *video still, "Threshold Series" (2013). Dimensions variable. High definition.*

I've been very fortunate to have received funding through a New York State Council for the Arts, Electronic Media and Film Finishing Fund grant, which will allow me to finish the video and sculpture portion of this project. I've also just gotten back from a residency at the Institute for Electronic Arts (IEA) at Alfred University, which also gets funding from NYSCA. The IEA experience really helped me begin developing the sounds for the individual specimens and was also instrumental in providing the resources to explore the digital and analog printing processes that I am now using.

JB: *In your series "Threshold," you create what feel like doorways or openings, into where is unknown. Sharing a visual similarity to your "Morphologies," "Threshold" differs in that the viewer becomes sucked in, rather than remaining an observer. Can you describe the process of creating this series, and what's behind it?*

PH: This series is a direct expansion on the techniques I'm using in the "Morphology Series" and came about when I was asked to participate in a gallery show called "Vascular Modes" at Hallwalls Contemporary Art Center in Buffalo, New York. The curator, John Massier, was intrigued by the idea of artists using the Gates Vascular Institute's architecture as a starting point for the creation of new art in the show. I've always seen a connection between architecture and the body—doors and hallways, valves and arteries, walls and skin, et cetera. With that in mind, I began what would eventually be the piece *9.14.8.15.18.18.5.19.3.15*. The organic valve was a key visual component that I wanted to highlight while I was developing this piece. This became an abstraction of a threshold that had to be confronted in some way.

The concept of liminality is key to this work. I really enjoy this idea of threshold and potentiality as one moves from one state to another. I feel like we're always in some form of threshold state in our lives. Each decision moves us forward into the unknown. Sometimes these are very small movements and changes, and other times they are monumental. Sometimes we linger on the edge unsure or afraid to take the next step through the threshold. That sense of not knowing is really important to me, creatively speaking. I want there to be mystery. I want there to be the potential for discovery. Likewise, I want the viewer to come to this work with



Untitled - *"Morphology Series" (2014-present). 24" x 18". Archival digital print.*

a sense of wonder and curiosity. The work is purposefully provocative. I want the viewer to face their feelings about the work, but, more importantly, I want them to be able to project their own states of liminality onto the work—to feel that they have an opportunity to go through the threshold if they choose.

JB: *Many of your films (and film's creatures) have sound that are reminiscent of being deep underwater, or in a vast ship in outer space, eliciting an otherwordly type of feeling. How and when do you create the sounds for each work? Do you know how a piece is going to sound before it is finished, or vice versa?*

PH: I love working with sound. It broadens the scope of my work and allows me to infuse a more vivid feeling of life into the video projects. I find that sound always informs and guides the construction of the video, but with these current projects, sound is usually done after the video is finished or at least very close to being done. For the "Threshold Series," I usually have an idea of what the sound will be. I may record some material and play with it but then wait until the project is done. With the "Morphology Series," I think the sound design is beginning to be dictated more by the specimens themselves. At the IEA residency, I was introduced to software that transforms a still image into sound. I'd take a frame from the morphologies video and the specific value, color, and spatial layout of the individual pixels would be the basis for the sound generated. That image could then be manipulated further by changing frequency ranges, audio levels, and duration. This, I think, is going to allow me to really individualize the sounds that each specimen makes. Right now, I'm really feeling my way around the software, looking at how the software interprets the image and seeing how far I can go with it. I'll then take that processed material and continue manipulating it to work specifically with the video through more editing.

JB: *To finish up, I'd love to hear a bit about your work as a teacher at the Fredonia Film and Arts Program.*

PH: The Film and Video Arts program is part of the Department of Visual Arts and New Media in the College of Visual and Performing Arts. It's a small program that's dedicated to creating film and video projects that are more experimental and less Hol-

lywood driven. Over the last few years, I've begun to build a stronger working relationship between the sciences and the Film and Video Arts program.

I believe students and faculty can benefit from seeing their research from new perspectives. This cross-discipline research can really open learning opportunities. The trick is making it a functional reality within an academic setting. This is where having administration that is willing to experiment with the process can help. We're taking small steps, but I think, if approached right, we'll be successful at developing an ongoing cross-discipline relationship. Recently, students in one of my advanced classes were given access to stereomicroscopes to shoot video projects in microscopic high definition and were given demos on the schools spectral confocal microscope. This opened up a whole new world for the students to explore. It was just our first tiny step into the microscopic world, but the students really enjoyed the obvious potential of the technology.

I have a student who just finished an engaging capstone project on her experiences with dermatographia and another student who is building up a really strong portfolio of time-lapse and macro cinematography. Both of these students have interests in the sciences and cinema. In my intermediate class, students have a project that often explores obscure phobias. Students create work that tries to acutely elicit deep emotional responses from viewers. Students enjoy seeing how the power of sound and moving image can have a psychological effect on viewers.

Fredonia is a liberal arts university with strong commitments to a broad educational experience. I think this helps students understand that the work they do in one class can inform their work in another class. Since so much of my interests in the sciences are based around movement and transformation, my dream would be to have a high-speed video camera like the Phantom Flex 4K, which shoots over 1,000 frames per second versus standard cinema cameras, at 24 frames per second. For the foreseeable future, this is out of our price range, but I'd love to provide this type of technology to my students and those in the sciences in the future.

Sexual Cannibalism in Praying Mantis *video still (2011). Dimensions variable. High definition.*

STRAIGHT TALK

with Kate MacDowell

By Danielle McCloskey
Contributor

DM: *Having formal training in English, teaching, and literature, you came back to the United States through Italy after living in India for a year and a half. It was after that you felt the urge to sculpt. How has the process been leaping deep into the art world, head first?*

KM: I think I've been very lucky. My early brightly colored pieces led to a first offer of an exhibit, and the porcelain work I created for that exhibit (once the images circulated online) led to many other opportunities, both to exhibit my sculptures and license the images for editorial and illustrative purposes. I do struggle with the isolation of working as an independent artist who isn't teaching or associated with a university. I miss human contact and have tried a variety of approaches from having interns to doing residencies and classes to be able to have colleagues.

DM: *You touch on different topics in regards to mankind's coexistence and impact on nature. How do you flesh out the subject matter on each piece? Is there one particular topic you gravitate toward?*

Skin Changers *closet (2015). Installation, size variable (alligator is 34" x 12" x 3" for scale). Hand-built porcelain, cone 6 glaze. Photographer Dan Kvitka. All images courtesy of the artist.*

Kate MacDowell sculpts haunting porcelain figures of animals, natural elements, mythological creatures, bones, and viscera—all with striking detail. After earning her MAT in English, teaching, and traveling, she began studying ceramics full time in 2004. Her work deals with the power play between humankind and nature. She now shows her artwork worldwide. You can find her work at *www.katemacdowell.com*.

KM: Not really, I tend to have an idea for a piece pop into my head, usually sparked by a case study I read about a particular environmental issue or an animal form I want to explore. I actually get most of my ideas while hiking and letting my mind wander. My family also works in the environmental field—on rainforest conservation and climate change, for example, so sometimes images or articles they pass on will germinate ideas.

Then, I go through a process of doing a little background research to flesh out the narrative in my own mind, and collecting many photographic images and scientific drawings for source material before making exploratory sketches. Most pieces take me about two weeks to sculpt, not counting time for firing or finishing, so I tend to try to avoid repeating the same idea exactly unless I'm making a collective installation or grouping.

So, for example, my piece *Only you can prevent* started when I learned about the spread of the destructive pine bark beetle in British Columbia and parts of the U.S. I read the theory that fire suppression campaigns as well as global warming created an ideal environment for this beetle and wanted to highlight the irony of an environmental protection policy with unintended consequences, so I created a sculpture in which the beetle attacks the head of 'Smokey' the bear in the way it would attack a tree trunk.

I have a solo exhibit, "Completely Exposed," opening at the Mindy Solomon Gallery in Miami on April 10, where I am showing new work, which explores diverse ideas from rhesus monkeys used in medical research and the martial behavior of ants to skin-changing myths.

DM: *One of your largest pieces,* Daphne*, depicts the mythological nymph shattered, mouth agape and paired with appendages broken off at her trunk. What drew you to make a piece about her, and what does mythology mean to you and your work?*

KM: Mythology is so evocative, both of cultural history and psychological experiences, and I like how a name can conjure up an entire story. Sometimes I'm also responding to an earlier piece of art, so this piece is actually a deconstruction of Bernini's marble sculpture, in which Daphne is pursued by an Apollo bent on rape. The physicality, passionate emotion, and grand tragedy of baroque sculpture struck me as a perfect style to express a much more contemporary disaster.

I created my own *Daphne* as a response to my experiences as a backpacker and hiker in Oregon and Washington stumbling across clear-cut

zones. I took Bernini's sculpture and transformed it by one additional step from woman to tree to clear-cut slash pile (the trunk is missing). The distress on the woman's face now reacts to a different kind of violence. I like that it can be seen as an eco-feminist analogy, a symbolic destruction of an iconic artwork, or just an alluring exercise in organic line and form.

Nursemaid 1, 2, and 3 *(2015). Dimensions variable. Hand built porcelain, cone 6 glaze. Photographer Dan Kvitka.*

DM: *You've mentioned that you have several ideas for site-specific pieces and have exhibited two,* Clay Pigeons *and* Lost Tribe. *Have you been working on any recently?*

KM: I'm in the very early stages of one involving Carolina parakeets, brightly colored, gregarious birds who were declared extinct in the 1930s. I'd really love to be able to put a flock in a tree and am thinking through the technical challenges of temporarily mounting ceramic birds so that they don't all shatter when the wind blows. There is something poignant for me about trying to temporarily repopulate an environment with man-made reproductions of an extinct species to capture on film in a staged tableau.

DM: *How did it feel to have your work on musician duo Erasure's "Tomorrow's World" album cover?*

KM: I was thrilled to be asked. I'd listened to them a lot in college, and I loved what the designer Tom Hingston did with colorizing and repurposing my imagery. The album is great; I really like "I Lose Myself" and "A Whole Lotta Love Run Riot."

DM: *What do you hope viewers can take away from your work?*

KM: I like best when viewers share with me their own interpretation of the narrative of a piece. I think there is a common experience of identification and empathy with natural flora and fauna. This and the 'beauty' of the white porcelain surface can lead some viewers to spend more time with a piece, which often has dark and disturbing implications. I'm often trying to work through my own feelings of loss or fear of loss due to environmental degradation, to highlight the sensory delights of texture and form, which may be removed from the world. That may come through to the viewer, or they may connect in a different way.

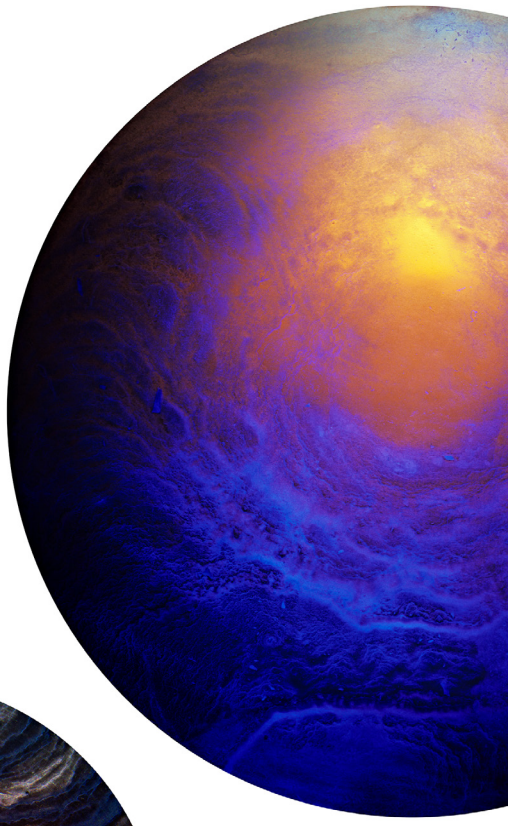
Daphne *(2007). 53" × 17" × 40". Hand-built porcelain. Photographer Dan Kvitka.*

Clay pigeons *(2010). Dimensions variable. Installation and photographs: Slip cast and hand carved terracotta, lead shot. Photographer Dan Kvitka.*

Lost tribe *(2012). Collection of 150 toads. Assembled size varies (toads have 2"-long bodies). Slip-cast and hand-built vitreous china, stain, glaze, and oil paint. Photographer Dan Kvitka.*

Scotch & Science:

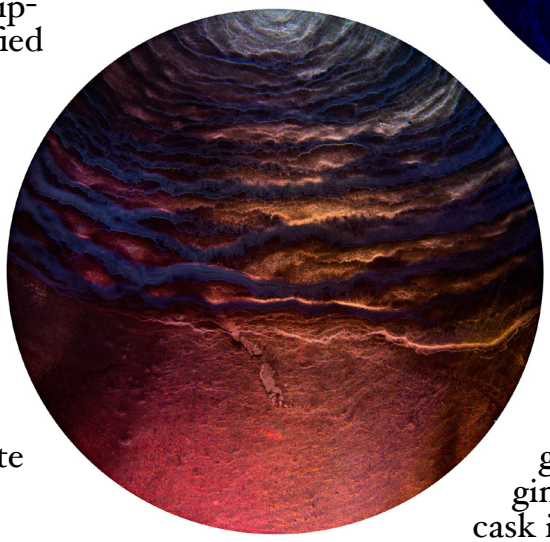
Ghosts in a Glass Lead to Potential Industrial Breakthrough



By Michelle Z. Donahue
Guest Contributor

Passing by a glass left out on a side table, Ernie Button picked it up to carry it to the dishwasher. But, chancing to look down at it before he put it away to be cleaned, he noticed something peculiar: a phantasmic imprint at the bottom of the glass. As he held it up to the light to get a better look, the smudge resolved itself into something more sublime: a series of smoke rings, patterns of chalk, embossed on the glass. On the previous evening, Button had been sipping on a Scottish whisky, and he was mystified by what now remained in the glass.

A photographer by personal passion, Button is drawn toward the mostly unobserved influences of human presence; the disregarded effects and artifacts left behind by the passage of people. To notice this shadow at the bottom of his glass was in keeping with his aesthetic interests, though on a decidedly more microcosmic scale—other subjects of his camera work have included portraits of rock formations in his home state of Arizona and from travels in Peru.



"It's hard to get away from the influence of man," Button said. "If there's a trail to the middle of nowhere, someone blazed that trail. A lot of my photography for the past fifteen to twenty years is really about the things that are often overlooked, the things that are ignored in the process of our daily lives."

But as a practicing speech pathologist, Button's analytical mind kicked in. The deposits were smooth, rhythmic, and organized. He started wondering: is there some way to replicate this? Some way to test if this was a one-off occurrence?

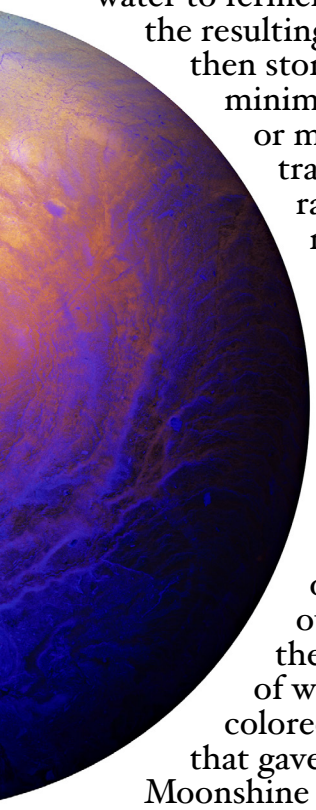
Answers would come. He flipped the cup over, shined a light through it, and snapped a photo.

Scotch wasn't in Button's early repertoire; he married into it when his wife, Melissa, and her family introduced him to it. He's gradually come to enjoy a little tipple here and there, but as one photo led to another, the questions began piling up. Do the rings change depending on the Scotch's geographic origin? Or the type of cask it's aged in? He knew, for instance, that labels like Laphroaig and Lagavulin are created with liberal portions of peat, while others, like Speyside and Macallan, don't use as much peat.

"I got the idea, is there a difference between a 12-year whiskey, to 15-year, to an 18-year?" Button said. "I thought it would be really fantastic if there was. I was precise in what I was doing. I put them on a slide, one drop of each, and let them dry."

Only whiskey produced and aged in Scotland can be called Scotch. The process involves sprouting barley, sometimes along with other cereals, drying the germinated grains—sometimes with peat smoke in the kiln—grinding them up, then mixing the grist with yeast and

water to ferment. Poured off from the mash, the resulting liquid is distilled twice and then stored in barrels to age, from a minimum of three years up to 18 years or more. It is this aging process that transforms Scotch whiskys from raw white lightning into the renowned golden liquors bearing the Scottish name. Button says at the moment, most anything from the Speyside region appeals to his taste.



He spent two or three years testing out different vintages—Scottish whisky and American whiskey—and even other types of alcohols. Though it turned out the patterns were essentially the same no matter the type or age of whiskey, it was only the amber-colored uisce aged in wooden barrels that gave him the results he was seeking. Moonshine and wine, no; rum, yes, though to a lesser extent.

Making observations along the way, Button began playing with ways of overlaying the different ring signatures, casting different shades of light from different angles to suffuse the images with an ethereal, otherworldly glow. Some portraits look like highly polished spheres of the rarest marble; others, like deep-space surveys; and others still akin to a fantasy of the deepest pit of the Mariana Trench.

Right as his interest was intensifying, Button happened to see an article about the ring that forms when a puddle of coffee dries, based on a 2011 study co-authored by Peter J. Yunker. Then a graduate student at the University of Pennsylvania and who now runs his own lab at Georgia Tech, Yunker described how the "coffee ring effect" could be halted by altering the shape of the tiny suspended particles in the solution.

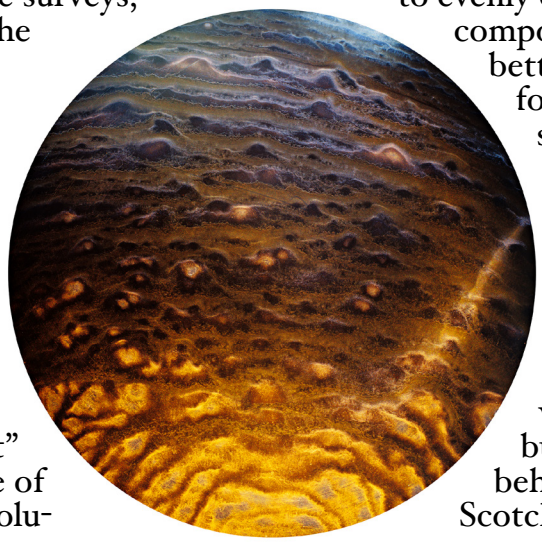
The ring's formation was dependent on the size and shape of the coffee particles distributed throughout the liquid. As spilled coffee dries, the outmost edge of the dried film forms as a thick, dark band. This band is created by suspended particles that are deposited through evaporation and a process known as capillary flow.

Button reached out to Yunker, who looked at the whisky rings but regretfully concluded a different effect was at play. So Ernie turned to the modern oracle: Google. Typing in "fluid mechanics" and "art," Ernie found Howard Stone, a Princeton expert in the physics of fluids.

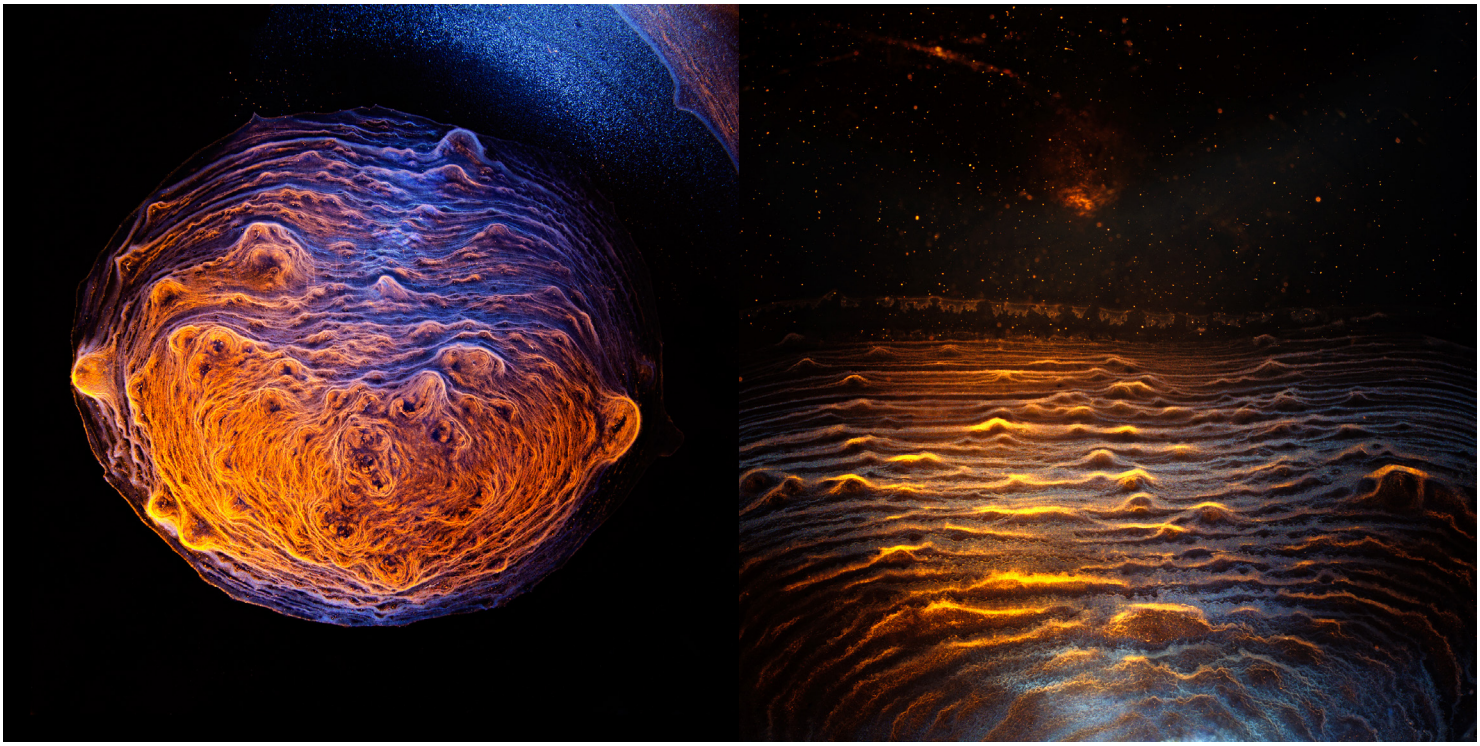
After a few emails sent back and forth, Stone said he found himself stopping by a liquor store to pick up a few bottles of Scotch whiskys ("I'm not a big drinker,") and asked his team of post-doc researchers to let some booze dry out in their free lab time.

As aesthetically pleasing as Button's photographs of his whisky rings are, Stone's interest in the rings centered in what they may portend for practical use. The whiskey's evaporative behavior was intriguing because it seemed to act differently than other evaporating fluids, depositing suspended particles in a very constant pattern, wholly unlike the thick, uneven bands coffee produces.

"From a tech perspective, when you want to deposit a layer, you often want it uniform," Stone said. Some areas of research study how to evenly cover an area with multi-component fluids, resulting in better ways to create films for windows, or emulsions for photo paper. So Stone, along with researchers Ian Jacobi, Eujin Um, Hyoungsoo Kim and Francois Boulogne, set out to recreate a lab-grown whiskey by mixing ethanol and water in a 35:65 ratio, but those mixtures didn't behave the same way as the Scotch spirits.



Among physical scientists, there's a well-known observation that the surface tension of water changes with the addition of chemicals, a phenomenon known as the Marangoni effect. In practical terms, it's what gives good wine its



All images courtesy of Ernie Button.

"legs," and what causes a floating film of grease to flee from a drop of soap. With this in mind, they added a chemical surfactant to their model mixtures to mimic the subtle chemical changes that take place in whiskeys during aging. The results were better, but still not close enough.

Thinking about the problem, they concluded that because whiskey is produced by collecting the distilled ethers produced from ground-up grains, it stood to reason that some microscopic particles remain.

"My group knew there were other components in whiskey," said Stone. "But since the deposits were fairly uniform, we guessed that it was something that would stick to a substrate." So the researchers added yet another ingredient: tiny polymer molecules.

The scientists didn't uncover the exact identity of the whiskey molecules; i.e. what they are made of or how they differ from brew to brew. But they did confirm that these molecules have some common characteristic that cause them to distribute uniformly and stick to a surface as their carrying liquid evaporates.

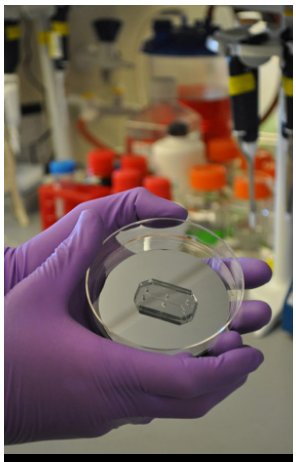
What surprised Stone the most was that the experiments yielded a novel understanding of alcohol-water mixture evaporation.

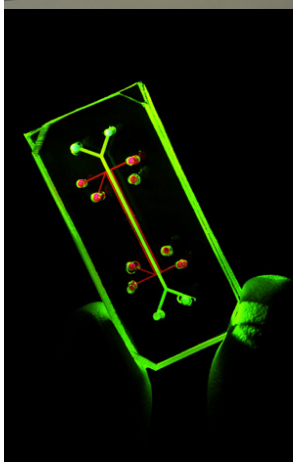
"My impression when we started was that we were pointing out certain features that are known in evaporating binary liquids," Stone said. "My impression now, because we have a better understanding of the discrete role played by the alcohol-water system and the polymeric component, is that combination of insights is new."

Hearing some of the results of the lab investigation, Button said he was a bit floored that his seemingly innocuous observation might lead to some real-world practical applications, such as better ways to cover larger areas with thin coatings. Some of his images accompanied a presentation Hyoungsoo Kim made on the project at the November 2014 meeting of the American Physical Society in San Francisco. A full paper on the topic is planned, with Button named as a co-author.

"He was the one who looked at it and said, it's pretty and I'll take pictures of it, but he's also the one who said, this is interesting and I want to investigate it," Stone said. "I ended up getting contacted, which is lucky for me. But his is the great insight. That's a sign of a wonderful mind."

Science and Art Shape the Future in Boston





By Alberta Chu
Guest Contributor

Science, art, technology, and design are intersecting, colliding, transforming, and fusing in established science laboratories as well as in new experimental venues in the Boston area. The inertia of thriving academics, innovative science museums, and public arts programs has gained momentum over the past decade. As we explore Kendall Square in Cambridge, Massachusetts Institute of Technology (MIT), Harvard University's Wyss Institute, and the Museum of Science, we find that scientists and artists—sometimes one and the same—are at it like never before in a town that cultivates and celebrates what happens at the intersection between the two.

Science by Design

The Wyss Institute for biologically inspired engineering at Harvard is the embodiment of science-based art. For Wyss Institute Founding Director, Don Ingber, "Design is central to my science." He recalls, "As an undergraduate at Yale, I took a class in sculpture and learned of the ideas of Buckminster Fuller and Kenneth Snelsen. That was my a-ha moment. Over the next thirty years, I did experiments applying the concept of tensegrity to biology and cells."

That Dr. Ingber lives at the design-art-science interface is evident in his approach to answering big scientific questions. In his research, Ingber envisions the essence of the organ, then builds it by the simplest means. With a nod to Buckminster Fuller, Ingber says, "You chip away at the incredible complexity of life to reveal the essence of it. Not only meaning but also mechanism, and not only to make a model but to be able to use that model to make predictions." Dr. Ingber's work, in which he grows living cells on computer chips, shows that the cells begin to exhibit emergent behaviors, just like cells in the body's organs, that specialize and work to function together. Surprisingly, Ingber's work has been embraced by the design world. *Organs on Chips* can be seen at MoMA in New York City in the current exhibition "This is for Everyone: Design for the Common Good," curated by Paula Antonelli, MoMA's Senior Curator of Architecture and Design. Additionally, MoMA has acquired *Organs on Chips* for their permanent collection. "That was certainly a dream, but not an intention," Ingber remarked happily.

When Don Ingber met David Edwards, the two immediately realized their art-science connection and began to produce public events, programs, and book projects together. Ingber makes the point, "Great scientists are like great artists. They have vision: the ability to envision is important in all great discoveries."

Boston is buzzing about Le Laboratoire Cambridge, the hybrid art gallery, restaurant, and lecture venue in Kendall Square conceived by David Edwards also of the Wyss Institute, who is also director of Le Laboratoire's first branch in Paris. Edwards explains, "Many of the questions facing us about innovation and change can no longer be dealt with in a classical lab setting. We are opening the creative process up to the public." A splashy red-carpet worthy opening in the fall featured performances of *Vocal Vibrations*, a collaboration between architect and designer Neri Oxman and composer and inventor Todd Machover (both of MIT Media lab), drawing celebrated area technology and design cognoscenti. With world-renowned chef Patrick Campbell (previously of No. 9 Park) at the helm and featuring coffee from Parisian coffee roaster Antoine Nétien, Le Laboratoire Cambridge/ Café ArtScience is a unique destination for

Above: Organs on Chips *recently acquired by MoMA NY.*
Photo credits: Wyss Institute at Harvard University.

Opening night at Le Laboratoire Cambridge. Photo Credit: Phase One Photography.

creative thinkers to relax, enjoy, and schmooze. Bartender Todd Maul and his staff create cocktails that owe a debt to science. The bar is equipped with its own centrifuge and supply of liquid nitrogen. Le Lab, as it's become known, has quickly become the place where artists, scientists, engineers, entrepreneurs and designers go to 'see and be seen'.

The space itself is unique in that every element seems designed to create desire. The sleek minimal space by Mathieu Lehanneur is composed of distinct components: Le Laboratoire art exhibition space, Café ArtScience and Bar, and the Honeycomb, where Harvard lectures and public programs for the Wyss often take place. Wyss scientist L. Mahadevan speaks on "Shapes and Flows of Nature" at the Le Laboratoire Honeycomb on May 20.

Don Ingber says, "The Wyss Institute empowers our scientists to ask the big questions and cross all the lines—it happens all the time. Edwards is creating a space for it to happen and translate it into impact, to empower people to follow their passions." Edwards describes his vision: "Experiments at Le Laboratoire Cambridge are about the creative process that is taking place at the intersection of science, art, and technology. We work with creators from a wide range of fields—scientists, designers, artists, musicians, chefs, et cetera—which enable us to explore ideas in a very meaningful way."

Ingber sums it up, "Really good people who try to solve mega-problems in the world have to cross boundaries. Le Laboratoire is an experiment to try to open up challenges to bring the tech sector and art sector together."

The strategic location of Le Lab Cambridge in Kendall Square—one of the most technology-dense places in the world and just steps from the MIT campus—is no accident. It is an area brimming with tech entrepreneurs, scientists, and engineers. According to Ingber, "You have

different types of creativity in the art and design world, and the two don't often intersect but Le Lab provides a space for the two to collide." Connecting cutting-edge scientific research and technological innovation to people is one of the goals of Le Laboratoire.

When Science Meets Art

Boston's Museum of Science (MOS) has discovered that the intersection of art and science can be an effective way to attract new audiences. Speaking about the goal of designing programs to cultivate new audiences and attract people who are not scientists, Lisa Monrose, Special Events Program Producer at the MOS says, "Art and the mash-up of science and art offer a different door through which to enter the world of science." Monrose initiated the MOS' highly successful "When Science Meets Art" series ten years ago, and it is ongoing. The series has featured luminaries in both art and science—and events are curated to highlight film, fashion, and performances. "When Science Meets Art" at the MOS is a hot ticket, often selling out events the same day tickets go on sale. Unsurprisingly, on April 29th the series will put the spotlight on Le Lab's David Edwards.

Museum of Science Events: David Edwards — Eating Bottles, Drinking Clouds, and Texting Your Evening Meal on April 29, 2015. Photo Credit: Phase One Photography.

Monrose observes, "Art in all its media—visual and sound art, performance, installation, film, fashion, et cetera—provides opportunities for people to learn through emotional and contemplative experiences, not just through intellect. My goal is to produce art experiences that will introduce people to new perspectives that might shift their understanding of our world and unleash their imaginations."

Edwards posits, "These kinds of art-science explorations might be relevant to the future of science, engineering, and medical research in that they chart a longer course of inquiry and introduce this inquiry into cultural, publicly engaged environments, where ideas can be shared, discussed, experienced by the public in a way that is not easily achieved in the classical peer-reviewed model. This can be particularly relevant at a time when the public is sensitive, sometimes fearful, in any case curious about the future—and wanting a role in shaping it."

Scientific Attractions

Another Wyss project, the research of scientist Wim Noorduin in collaboration with electron microscopist James Weaver, has recently received design acclaim. Their 'nano-flowers' were selected for inclusion in "Nature Made," a group exhibition curated by François Bernard at Maison & Objet Paris. "Francois wanted to show how people use natural processes to sculpt new shapes." Wim's reaction when he was first approached was, "What's going on here? I'm a chemist!" He adds, "I'm surprised that what we are doing on a micro scale is interesting to the world of architecture. It was very exciting—it was the first time we did something like that!"

Noorduin's research in Joanne Aizenberg's lab at the Wyss focuses on biomineralism: how organisms in nature build their highly intricate structures. He asks, "What are the ways to form these kinds of complexities?" Observing that organisms control their chemical environment, Noorduin thought that if he could control the environment, perhaps he could grow complex structures: "I needed to find a chemical reac-

tion sensitive enough to trigger pattern formation processes." The resulting pattern in solid state shows how carbonate salt with silica seed crystals nucleate and grow. Explaining his discovery, Noorduin observed that "changes to the environment impact the self-assembly process that's going on. Small changes in parameters make enormous changes in the shapes."

The nano-flower structures are half the width of a human hair. Samples the size of a postage stamp contain thousands and even up to millions of structures at the submicrometer level. At this level, scientific visualization is an extremely powerful tool. In this nano-scale research, the key analysis method is electron microscopy. Noorduin explains, "The first thing I do is put it in the electron microscope." Going further, Wim says, "It was really a struggle to show people how complex these structures are. I have learned a lot from James Weaver about how to visualize parts of the sample. The first time Weaver looked at viewed nano-flowers, he felt like he was 'diving in an ancient primordial coral reef.'"

Leading-edge electron microscopist James Weaver clarifies, "Visualizations like electron micrographs are science, and art." Noordin adds, "There's a lot of science behind the growing of these structures, but the cool thing is the visual result. After the *Science* (cover, May 17, 2013) paper came out, because of the visual attractiveness, we got attention from corners of the world we were not used to. It felt very special that a completely different group of people was interested in our research." Enthused, Wim says, "It's so gratifying to do this research and then have the research really connect with people!"

The Arts Are in the DNA at MIT

MIT is known to be a place to solve problems and explore science. However, the institute has long seen the value of artist and scientist collaborations. "While many schools now are interested in building cross-disciplinary programs, it has been embedded in the MIT culture since post-World War II and solidified under the leadership of [former institute president] Jerry Weisner" says Leila Kinney, Executive Director of Arts Initiatives and of the MIT Center for Art, Science, and Technology (CAST). Kinney continues, "The arts and humanities are fundamental to an education at MIT." With the CAST initiative launch in 2012, there is new enthusiasm for MIT's Visiting Artist Program. MIT visiting artists are nominated by research staff and selected by committee review. The roster of visiting artists include Tauba Auerbach, Vik Muniz, Trevor Paglin, Anne Lilly, Olafur Eliasson, Tomás Saraceno, Mel Chin, and Rick Lowe. Visiting artists may spend a semester at MIT, or visit occasionally over several years. It's inspiring being at MIT, as Kinney explains, "Artists come here to learn new things that resonate with their work." Tomás Saraceno (featured on the cover of *SciArt in America* in February 2015) has been a visiting artist since the program's inception and returns regularly. Saraceno will revisit MIT in April for the "Active Matter Summit: Programming Materials to Sense, Transform, and Self-Assemble," to be held at on April 24th and 25th, a conference organized by Skylar Tibbits and Athina Papadopoulou of the Self-Assembly Lab at MIT.

This year's visiting artist, Anicka Yi, explores ambiguities in sensual perception, meaning, and material. Anicka is making a diverse range of work in collaboration with MIT scientists. MIT CAST Producer of Artist Residencies and Public Programs Meg Rotzel works between artists and scientists, distilling what artists are interested in and helping to identify the appropriate scientist, explaining that "when you find two people who are excited, they ignite new questions." In 2012, Rotzel worked with MIT synthetic biology post-doctoral researcher Tal Danino to produce the collaboration with visiting artist Vik Muniz (2012–13) and knew Tal was eager for another project. "You need a scientist that has an open mind—to see beyond the research, who can ask the big open questions. Tal and Anicka found that together." Rotzel continues, "Tal does cutting-edge research with bacteria, Anicka was interested in working with living organisms, and the two hit it off." The resulting collaboration created *You Can Call Me F*, a perfume scent from the DNA of 100 women using genetically engineered bacteria as well as the visual display of bacterial samples. The work opened at the Kitchen in New York City on March 6th and is on view until April 11. Kinney emphasizes, "These are true collaborations. Something happens that has never happened before."

The Art and Science of Bacteria workshop: Anicka Yi and Tal Danino
Photo Credit: L. Barry Hetherington Arts at MIT

"What we're trying to do is to advance both the arts and the sciences. Illustrating science is not really the goal for us, we really want to work on the edge—to bring the two together in order to educate and excite each other and push the boundaries of both disciplines. We want artist and scientists to come together to further their research on both sides," explains Rotzel.

Alise Upitis, assistant curator at the MIT List Visual Arts Center (LVAC), finds that Yi's work exemplifies "irreducible ambiguity [and often] changes over time in unpredictable ways due to the environment." For her upcoming MIT List show, Yi will create a tableau revolving around a pond containing various manner of objects, and enveloped by the distinctive scent of mint. The work is part of Yi's ongoing "Flavor Genome" project. Yi will work in collaboration with movement arts pioneer and MIT alum Seth Riskin at the MIT Museum Studio to develop lighting elements for the piece. Yi's MIT LVAC exhibition opens May 22 and ends July 26.

Catalyst Conversations: Art and Science in Dialogue

MIT's LVAC also provides support for the art and science lecture series "Catalyst Conversations." Artist, educator, and curator Deborah Davidson sought a way to enable Boston-area artists to get more recognition for their talents and hard work. "I was noticing in a lot of gallery shows the tremendous interest in science and technology." This was the impetus for Davidson to start a series of public talks so people could get to know the artists and their work as well as learn about the science that inspires the work. Davidson's thoughtfully curated monthly lecture series is designed to educate and inspire. Catalyst Conversations has featured Alan Lightman, Felice Frankel, Janet Echelman, and Heather Dewey-Hagborg. After the featured scientist and artist presents their work, an organic open conversation with audience participants creates a space that truly puts art and science in dialogue. Davidson observes, since launching Catalyst Conversations in 2012, "As I've been doing this, I am seeing both worlds opening up to each other."

It appears the sciart bases are covered in Boston this spring. The co-mingling of art, science, and technology spark inspiration and increase the public understanding of cutting-edge research, bringing the future ever closer. One can only imagine what may ignite at the next Arts at MIT, MIT LVAC, Catalyst Conversations, Museum of Science, or Le Laboratoire event. Who's ready to sidle up to the bar at Café Art-Science and partake in a bit of empirical study?

Alberta Chu (Twitter @ASKlabsAlberta) is a content creator exploring the intersections of science and art at ASKlabs (www.asklabs.com). Chu will speak at Catalyst Conversations at MIT in April to introduce a new global citizen science project to build a taxonomy of faces. Tune in April 27th at 7pm EST: #CCfaces, @ Facetopo.

SPOTLIGHT

I've made these photographs to better know my place in the universe. Our ability to travel the cosmos being limited, I've built a machine in an attempt to observe elemental transactions. I've created a mechanical solution to what is a metaphysical problem, forcing basic elements of perception—sound, light, and matter—into a single frame.

These are photographs of sound encountering light as seen through the medium of water.

On one hand, I've staged common phenomena, and on the other hand, I've captured tiny cataclysms never to be repeated. I bring you evidence of a minute history, in which no instance is petty and every instant too complex to perceive in its entirety.

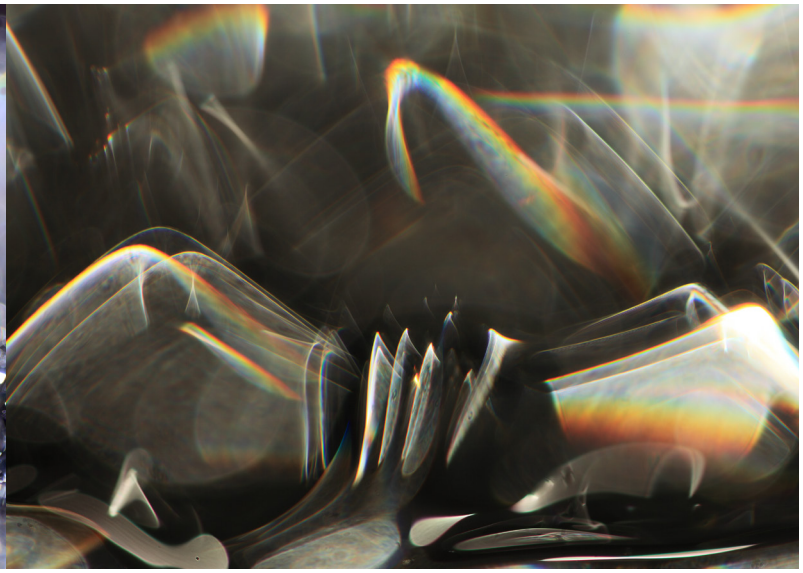
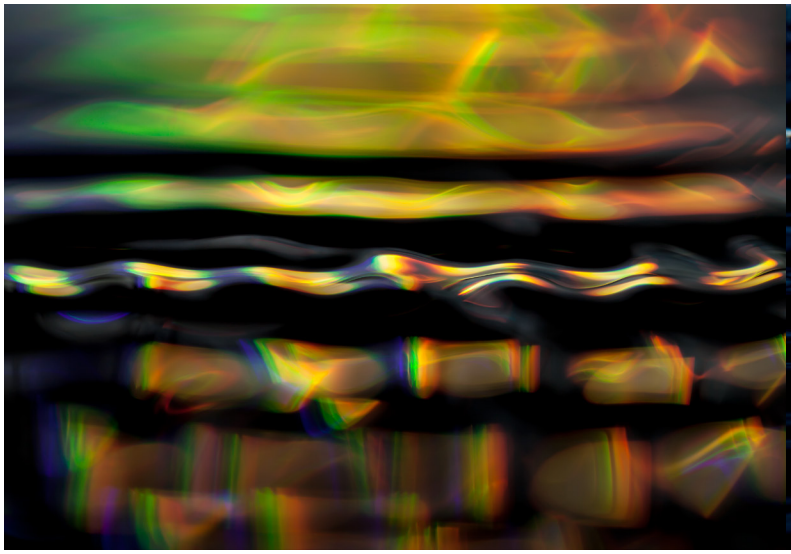
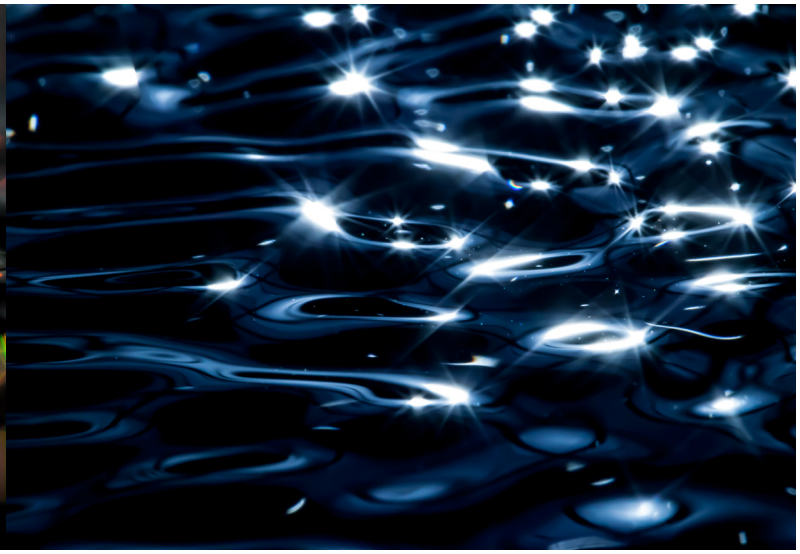
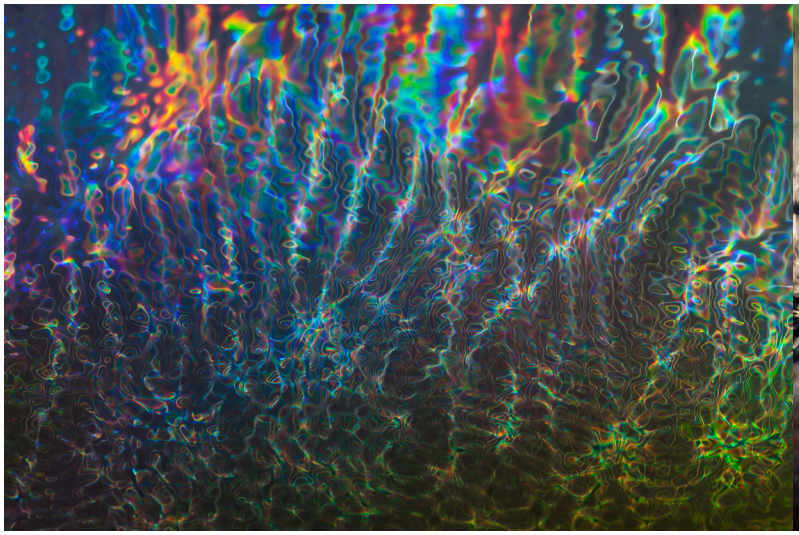
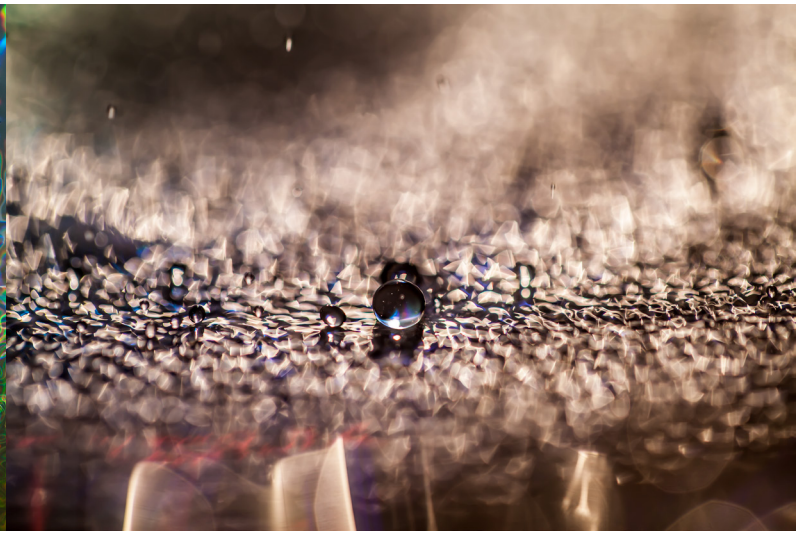
A moment is all time, an atom the universe.

These photographs aim to capture the beauty and turmoil that occurs inside the most pedestrian events. Sunlight bounces on water, sound waves march toward oblivion.

- Sasha Raphael vom Dorp, artist

Sasha Raphael vom Dorp was born in Taos, New Mexico and has been exhibiting his work since 1992. He is currently working on the creation of an immersive integrated system, which applies light and sound to matter in a way that forces the observer to experience a fusion of their senses. He works in two studios, Los Angeles, CA, and Taos, New Mexico.

www.sashavomdorp.com

All images courtesy of the artist.

Symbiosis in Physics and the Humanities:
How Fermilab Nurtures Creative Community

ART@CMS Gallery Reception. Photo by Reidar Hahn.

By Megan Guerber
Contributor

In the Chicago suburb of Batavia, Illinois lies the sprawling campus of Fermi National Accelerator Laboratory or Fermilab, America's premier laboratory for particle physics and accelerator research. This 6,800-acre site is staffed by 1,750 employees from around the world and is home to more than just scientific research. Open to the public from dawn until dusk, the grounds offer ample opportunities to learn not only about particle physics but also nature, technology, and the scientific method.

Much like the field of art, the field of particle physics aims to explore and understand our existence. The study of subatomic particles, their composition, and the forces that propel their interactions has transformed society in unprecedented ways. Many innovative technologies, including the Internet and PET scans, have come out of particle physics laboratories, greatly affecting both the health and industry fields. Even the use of synchrotron light sources, Earth's brightest light beams, have led to discoveries that have affected how we restore works of art. The Fermilab campus reflects the wide-reaching influence of its research by bringing together many eclectic cultural events as a means to celebrate both science and community. Film screenings, music performances, nature trails, and even barn and folk dances help Fermilab to enrich the lives of its employees as well as bring scientific knowledge to those who may not otherwise experience it.

On the second floor of the landmark Wilson Hall is the Fermilab Art Gallery, which endeavors to use visual language to talk about science. The gallery is an open space with large windows that employees frequently walk though, making it both informal and inviting. As gallery director Georgia Schwender explained, it's far from your typical white cube. "The gallery itself is a utilized environment. Employees and scientists meet in the gallery. [It] is not just a place to look at artwork, it's a way to enrich your life on a daily basis." The gallery strives to connect artistic expression with the ongoing research at Fermilab as a means of sharing information in

Art@CMS Banners in Wilson Hall with CMS staff. Photo by Reidar Hahn.

Wilson Hall and Reflection in Swan Lake at Night. Photo by Reidar Hahn.

new and exciting ways. In correlation with lectures, performances, and workshops, the gallery helps to open up otherwise intimidating scientific ideas to new audiences as well as to enrich the thinking of many scientists.

"I want people to look at the art displayed in the gallery and think," explains Schwender. "Artistic expression interprets experience and transforms it into a shared concept. Science is similar with how discoveries are made."

Fermilab's latest exhibition, "Art@CMS," celebrates the awe-inspiring instrument that helped enable the discovery of the Higgs boson in 2012: the Compact Muon Solenoid (CMS) Detector at the Large Hadron Collider at CERN. To say the least, it is no small tool and a marvel to behold. Standing at 50 feet tall and weighing 14,000 tons, this scientific instrument enabled the detection of the smallest particles of matter in the tiniest fraction of a second.

"Art@CMS" has already toured nine countries and been visited by more than 40,000 people. The main attraction is a life-size two-dimensional replica of CERN's CMS detector that expands throughout the atrium of Wilson Hall. The installation is rendered via photographic banners created by Swiss-born physicist and photographer Michael Hoch, organizer of the exhibition. Eight other professional artists who studied with CMS scientists also have work displayed in the gallery. Their paintings, sculpture, and mixed-media creations bring a visual understanding of this highly complicated area of study, helping to communicate just some of the wonders of science to new audiences. Fermilab's first artist in residence, Lindsay Olson, also contributed new work to the current installment of this international show.

In addition, "Art@CMS" initiated public dialogue by hosting student workshops called "Imagining Physics: Art Inspired by Fermilab." Over five sessions were held at Water Street Studios in Batavia. Local high school students were given the opportunity to tour Fermilab laboratories, learn about particle physics and make their own art inspired by what they saw. The work they created has been on display at Water Street Studios as well as Fermilab Gallery.

The show has been a great success. Perhaps there could be no stronger muse for a science-based artist. As stated by Michael Hoch, "Why am I inspired by the CMS detector? You just have to look at the high-resolution life-size picture of it that will be on display." Hoch said. "There's an intrinsic geometry that just grabs you. There is beauty in science that we want to communicate to a wider group of people, at the same time inspiring them and making them curious to understand more about the science."

Poetic links such as the life-sized replica of CERN'S CMS detector are not uncommon throughout Fermilab. A herd of bison roams the campus as a reminder not only of the geographic heritage of Illinois but also of Fermilab's mission to conduct pioneering research into new frontiers. Much of the programming is thanks to Fermilab's founding director, Robert Wilson, who, Schwender says, "believed that creating an intellectually rich and diverse environment was an essential part of building a great scientific laboratory." Wilson's vision led to the establishment of the Fermilab Arts and Lecture Series and Art Gallery, which in turn has provided an enduring connection between the laboratory and its neighbors. According to Schwender, "The gallery itself is an integrated part of what makes Fermilab more than just a research facility: it's a community."

Fermilab understands science to be an integral part of life and actively strives to connect its intrinsic value to the public in fun and innovative ways. Whether it is a trip to the Leon M. Lederman Science Education Center, an afternoon spent fishing in one of its many ponds, or some quite moments of contemplation in front of the "Art@CMS" exhibition, Fermilab continues to combine science and culture in unassuming and accessible ways. In particular, the Fermilab Art Gallery plays an important role in this work by presenting exhibitions that reinterpret scientific information in a way that benefits both those working in its laboratories and those new to the field. Its well-rounded programming enriches the lives of its scientists and the local community alike, helping to nurture the curiosity of budding young artists and scientists about the world around them.


SAiA